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# BMJ Open

## Shared lessons from Liberia and the UK for building a people-centred resilient health systems response to COVID-19

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## Abstract

Introduction: COVID-19 has tested the resilience of health systems globally and exposed existing strengths and weaknesses. This study uses the concept of people-centred health systems to explore the applicability of the Foreign, Commonwealth and Development Office (FCDO) principles for health systems' resilience in two contrasting contexts – Liberia and the UK.

Methods: We carried out qualitative interviews with 24 health decision-makers at National and County Level in Liberia and 42 health actors at County and hospital level in the UK (Merseyside). We explored these health systems' decision-making processes and capacity to adapt and continue essential service delivery in response to COVID-19 in both contexts.

Results: Study respondents in Liberia and Merseyside had similar experiences in responding to COVID-19, despite significant differences in health systems context, and there is an opportunity for multi-directional learning between health systems in the global south and global north. The need for early preparedness; strong community engagement; clear communication within the health system, and health service delivery adaptations for essential health services emerged strongly in both settings. We found the FCDO principles valuable for reviewing health systems changes in response to a shock such as a natural disaster or pandemic, and based on our findings we identified two additional principles; 1) the need for functional structures and mechanisms for preparation and 2) adaptable governance and leadership structures to facilitate timely decision-making and response coordination. We find a people-centred approach can help ensure service adaptations are acceptable to, and understood by, patients and health workers, and continue the provision of 'routine services' for individuals during health systems shocks.

Conclusion: Our study highlights the importance of a people-centred approach, which places the person at the centre of study and analysis of the health system, and value in applying the FCDO principles across diverse settings.

### Strengths and Limitations of the Study

- A key strength of this study is the multi-directional learning between health systems in the global south and global north, which involved a wide range of researchers across both settings, and the breadth of perspectives captured from frontline staff and key decision-makers.
- We find that the FCDO principles can be usefully applied across diverse contexts, with identification of two additional new principles, related to mechanisms for advanced preparedness and adaptable governance and leadership structures.
- The greatest limitation of this study is that it was carried out at a single point in time, towards the end of the first wave in the UK and before there had been a large increase in cases in Liberia. Response measures have evolved in both settings in subsequent stages of the pandemic.
- The study was limited by the differing range of respondents across study settings, with participants from across a range of health system levels including primary care, hospital frontline workers and decision-makers as well as regional decision-makers within Merseyside, UK; compared with national and county level decision-makers, technicians and supervisors of frontline staff in Liberia, which may result in differing perspectives.

## Introduction

The COVID-19 pandemic has forever altered our world. It's impact has been felt across all nations, demonstrating the importance of resilient health systems in protecting global health security.[1]

Health systems have been forced to adapt to new ways of working alongside the continued provision of essential services including: prevention of communicable diseases; sexual and reproductive health; care for vulnerable populations; ongoing management of chronic illness (including mental health conditions); continuity of critical inpatient therapies; management of emergency health conditions; and auxiliary services, including diagnostic imaging, laboratory and transfusion services.[2]

In April 2020, the United Nations expressed concern that, within Africa, up to 3.3 million people could lose their lives as a direct result of COVID-19 and many more through the indirect effects of disruption to health services and worsening socioeconomic conditions.[3] Conditions considered to increase the risk of infection include overcrowded and poorly serviced slum dwellings; limited access to basic handwashing facilities; high levels of informal employment limiting ability to work from home; high levels of malnutrition and lower ratios of beds and health workers to the population.[3] A commentary published by Agyeman et al. (2020) at the outset of the pandemic highlighted a rapid response within many African settings, including focus on early introduction of screening procedures at ports of entry, need for effective community engagement to educate about the mode of transmission. Key protective behaviours were emphasised, along with the need to prepare intensive care beds and clear government strategies regarding how to deal with hospitalised COVID-19 patients to avoid disrupting the health system and to prevent non-COVID-19 related deaths.[4] Subsequent studies have revealed that indirect health impacts from COVID-19 disproportionately impact women and children.[5,6] Diversion of resources (financial, material, human) from existing health services to address the pandemic, impacts their care.[5,6] This includes supply and demand side disruptions that can result in lower utilization of health care and, in some cases, impact on quality of care.[7] Bayani et al (2021) surmise that "less



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3 health care will result in more ill health and deaths because health services have been suspended,  
4 displaced, or inaccessible.”(page 5 [7])  
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8 Our study was carried out immediately following the first wave of COVID-19 in Liberia and UK (interviews  
9 carried out June to September 2020) in response to an expressed need by stakeholders for this research  
10 following dialogue in both contexts. The pandemic has continued to evolve across both settings, with  
11 both Liberia and UK experiencing much larger waves of COVID-19 since this original study was carried  
12 out. These findings from the first wave can provide valuable lessons to inform continued response to  
13 COVID-19 and other health systems shocks.  
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22 The pandemic has revealed monopolies of knowledge production, which disempower lower and middle-  
23 income countries;[8] whilst pandemic responses in ‘developed democracies’ have been inadequate,  
24 with cuts to health and social services and limited commitment to equity or governance.[8] So-called  
25 “global powerhouses with tried and tested health systems have struggled to contain the COVID-19  
26 pandemic”[9] and health systems have been stretched to the limit, resulting in negative implications for  
27 the health of all populations, particularly when access for patients with other acute and chronic illness  
28 is limited.[8] As of 01/09/21, UK (population 67.2 million)[10] has 6,821,356 confirmed cases and  
29 132,859 COVID-19 related deaths.[11] In the UK, the National Health Service delivers care for most of  
30 the population. Meanwhile during the same time period, Liberia (population 5.1 million)[10] has had  
31 5594 confirmed cases, with 245 confirmed COVID-19 related deaths.[11] Liberia was initially hailed as  
32 one of the top countries in fighting COVID-19, being one of the first countries to start screening at ports  
33 of entry (January 2020) and to adopt other control measures such as rapid testing, contact tracing and  
34 quarantine.[12,13]  
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51 “Improving resilience within health systems can build on pre-existing strengths to enhance the  
52 readiness of health system actors to respond to crises, while also maintaining core functions.”(page 1  
53 [1]). People-centred health systems are a critical framing in shaping resilience as they place people  
54 and communities at the centre whilst also promoting strategic and collaborative multi-sectoral  
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3 leadership which is necessary in delivering a co-ordinated response to a public health crisis.[14] In this  
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5 paper, we compare health systems responses at a single point in time (June to September 2020) within  
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7 Monrovia, Liberia and Merseyside, UK to distil lessons for health systems resilience to a pandemic  
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9 through comparative case studies which explore aspects of health systems resilience.[15] Both contexts  
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11 have a commitment to the development of people-centred health systems, and so within this paper  
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13 we combine the Foreign, Commonwealth and Development Office (FCDO) eight key principles for  
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15 promoting resilient health systems with key domains and values of people-centred health systems to  
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17 frame our findings in relation to the COVID-19 response.[16] Through our discussion we reflect on  
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19 these principles against our conceptual framework (figure 1), which is based on a people-centred  
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21 approach. In response to a recent call for on-the-ground analysis of the response to COVID-19 within  
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23 the Global South and comparative case studies that use co-creation and coproduction approaches which  
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25 go beyond researchers including policy makers, practitioners and the public,[15,17] we seek to share  
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27 learning from the response within Liberia and the UK, along with opportunities for multi-directional  
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29 knowledge sharing.[17] It is our hope that this paper will help inform health policy makers across global  
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31 contexts, for the current pandemic response and as they plan towards more resilient people-centred  
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33 health systems to meet future shocks.  
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## 39 **Methods**

### 40 Study context

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45 Liberia and UK have had very different strategies and case rates from the outset of the pandemic,  
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47 although there were some similarities in the adoption of infection prevention control measures across  
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49 both contexts. Liberia is amongst the world's poorest in terms of GDP and living conditions. According  
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51 to the World Bank 2016 poverty headcount ratio, 44.4% of Liberians live below the international  
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53 poverty benchmark of \$1.90 USD per day.[18] The UNDP Human Development Report 2020 ranks  
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55 Liberia low at 175 out of 189 countries and territories.[19] Inequities between females and males are  
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57 remarkable with literacy rates (secondary education) of 18.5% and 40.1% respectively.[19] Liberia has  
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3 prior experiences of shocks in the form of two civil wars, and the 2014-2015 Ebola Virus Disease (EVD)  
4 epidemic. In response to these experiences, Liberia has prioritised rebuilding a resilient health system,  
5 which acknowledges the critical role communities play in addressing their own health needs through the  
6 'Investment Plan for Building a Resilient Health System in Liberia' and the community health services  
7 policy (2016-2021).[20,21] By contrast, Merseyside is a Metropolitan County in the North West of  
8 England, comprising five boroughs, including the City of Liverpool, including some of the most deprived  
9 council areas in England.[22] It has a population of 1.42 million and has had some of the highest numbers  
10 of COVID-19 cases in the UK.[23] Within Merseyside, the Liverpool City Region Combined Authority has  
11 prioritised tackling deprivation and reducing health inequalities through people-centred care, with  
12 integration of health and social care services.[24] Liverpool has a long history of public health innovation,  
13 but also a strong sense of local history, culture and place. Throughout the pandemic Liverpool has been  
14 at the forefront of community-based innovations and public health strategies, e.g. piloting community  
15 open access testing for COVID-19.[25]

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Liberia introduced stringent border control measures from January 2020, with the establishment of a  
Special Presidential Advisory Committee on Coronavirus (SPACOC) over two months prior to the first  
recorded cases in the country.[26],[27] Liberia's response to COVID-19, prioritised a call to maintain  
the delivery of routine health services at all levels. Hospitals and clinics continued to provide health  
services with health facility workers trained in infection prevention control (IPC) before the first case  
was identified in country.[27] Physical distancing measures were introduced and use of face masks  
encouraged.[28]

Within the UK, health service delivery was restructured as part of the COVID-19 response, with routine  
non-urgent elective care suspended and later re-started in April 2020.[29] Adaptations to minimise  
potential risk of COVID-19 infection include the use of telemedicine and phone consultations; and  
changes to essential services for patients, such as changed treatment plans and delays to surgeries.[30]  
Hospital patient pathways were altered to appropriately triage and cohort the care of COVID-19 patients,

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3 reducing the risk of transmission to others and allowing essential services to continue. There was also  
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5 reduction in routine blood test screening to prioritize COVID-19 PCR testing in response to the UKs  
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7 'test and trace' strategy.  
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### 10 Study aim, design and conceptual framework

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13 Aim: To understand COVID-19 adaptations and decision-making in Liberia and Merseyside, UK  
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16 This qualitative study explored inductively the differing experiences, perspectives and  
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18 recommendations of participants in order to understand COVID-19 adaptations and decision-making  
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20 in Liberia and Merseyside, UK.[31,32] We selected qualitative methods to give “due emphasis to the  
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22 meanings, experiences, and views of all the participants”(page 43 [31]) and understand decision-  
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24 making and the impact of health systems adaptations as a result of COVID-19.  
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29 A conceptual framework was jointly developed, following a series of meetings held with researchers  
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31 in each setting (7 Liberia-based researchers and 18 UK-based researchers). This framework sought to  
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33 consider a people-centred approach towards the health system’s ability to respond to shock, whilst  
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35 reflecting the realities experienced in the face of multiple routine challenges (Figure 1).[33] The  
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37 nature of a shock to the health system, whether due to infectious disease outbreak, natural disaster,  
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39 or conflict, influences the rest of the framework.[34] It adopts a people-centred approach at it’s  
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41 heart,[14,35,36] while incorporating literature relating to the health system’s ability to respond to a  
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43 sudden shock, and the extent to which it is able to absorb, adapt and transform in response (Figure  
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45 1).[34,37–41]  
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49 People-centred health systems prioritise the collective right to health through integrated and targeted  
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51 approaches that favour the needs of the most vulnerable.[14,42] Collective action and social solidarity  
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53 are viewed as essential to the art and science of the development of people centred systems that are  
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55 organised around people’s health care needs and expectations as opposed to diseases, ensuring a  
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57 continuum of care throughout the life course.[14] This approach embraces the human character of  
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3 health systems, by viewing individuals, communities and health workers as co-producers of health  
4 care, placing people and families at the centre.[43] Systems must adapt to meet a range of challenges  
5 to support the development of strategies that seek to improve health care access and encourage  
6 universal coverage. This is particularly important as many individuals transition and oscillate between  
7 multiple roles of patient, family and sometimes health care provider within one system.  
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10 Interview topic guides were informed by the framework and developed across both settings to explore  
11 key areas of health systems functioning in response to COVID-19 (Appendix 1). Questions included:  
12 governance and decision-making; use of ethical guidelines; human resource management,  
13 infrastructure (information technology and communications) and health care worker support;  
14 introduction of innovations; and perceptions of the equity and quality of service delivery. Adaptations  
15 were made according to the health systems context in each country, for example in Liberia, additional  
16 questions were included to explore how learning from the EVD epidemic and other health systems  
17 shocks informed COVID-19 response planning.  
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### 36 Study participants and data collection 37

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39 The study was carried out at different levels of the health system across both settings (Table 1). In  
40 Liberia, we conducted key informant interviews in June and July 2020 with 21 national level and three  
41 county level decision-makers (Nimba, Margibi and Montserrado Counties) purposively selected  
42 because of their involvement with COVID-19 planning and/or routine service delivery. Some had also  
43 played key roles in the EVD epidemic response. In Merseyside we conducted 42 key informant  
44 interviews between July to September 2020, with regional, hospital and primary care decision-makers  
45 (general practitioners and residential care home manager) and front-line workers selected because of  
46 their involvement with COVID-19 planning and/ or the delivery of COVID-19 or routine services (see  
47 Table 1). More interviews were carried out within the UK across health systems levels, due to demand  
48 for research across multiple levels and the presence of a larger team of researchers. In Liberia, by  
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contrast the demand for research was focused at national level, and the research team was smaller in size.

Table 1 Study participants' role

Participant Role	Number of Participants Interviewed
<b>Merseyside, UK</b>	
Regional decision-maker	5
Hospital decision-maker (Clinical director, medical director, ward manager)	4
Hospital consultant	11
Hospital health worker (junior doctors, nurses)	10
Health worker in community (GP, district nurse, residential care home)	7
Liverpool Clinical Laboratory staff	5
<b>Total</b>	<b>42</b>
<b>Liberia participants</b>	
National decision-maker	21
County decision-maker	3
<b>Total</b>	<b>24</b>

Interviews were predominantly carried out remotely by researchers experienced in qualitative interviewing in English language, via online platforms such as Microsoft Teams or Skype. A minority were carried out in person with physical distancing measures in place, according to local guidance at the time. All interviews were audio-recorded. Data collection stopped when no new themes emerged from additional data collected.[44] Interviews lasted approximately 30 to 60 minutes.

#### Data Analysis

Audio recordings were transcribed verbatim, with quality assurance conducted by a second researcher against the recording. In both Liberia and UK, preliminary data analysis workshops were held with the research team members involved with data collection. Prior to the workshops all participants reviewed transcripts to familiarise themselves with the data. Through these workshops key emerging themes were identified and used to generate a separate coding framework for each setting. All transcripts were imported into NVivo Version 12 qualitative data analysis software for coding (QSR

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3 International Pty Ltd. Version 12, 2018). Most of the emerging themes aligned closely with the FCDO  
4 principles and were mapped accordingly. Only two of the identified themes were not covered by the  
5 FCDO principles, and therefore formed two new additional principles relating to “mechanisms for  
6 advance preparation” (Principle 9) and “adaptable governance and leadership structures” (Principle  
7 10). Detailed findings and recommendations were developed into two policy briefs in accordance with  
8 these principles and were shared and discussed with relevant stakeholders from both study  
9 settings.[28,45] The relationship of the findings to the original conceptual framework was reviewed  
10 and findings compared between settings during a final on-line workshop, attended by all those  
11 involved with data collection in both settings, with key similarities and differences jointly discussed.  
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### 23 24 Ethics

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27 Ethical approval was received from the Liverpool School of Tropical Medicine Research Ethics  
28 Committee (Protocol ID 20-045); the University of Liverpool Ethics Committee (Reference 7811) and  
29 the University of Liberia-Pacific Institute for Research and Evaluation Institutional Review Board;  
30 National Health Service Health Research Authority and Health and Care Research, Research Ethics  
31 Committee (Reference 20/HRA/2597); Integrated Research Application System (Project ID 284143).  
32 All study participants were provided with a participation information leaflet at least 48 hours prior to  
33 interview. All participants provided written, or audio recorded consent to participate.  
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### 43 Patient and public involvement

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46 Neither patients nor the general public were involved in the design, conduct, reporting or  
47 dissemination of our research.  
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### 50 51 **Results**

We present findings according to the FCDO principles (Box 1)[16] (key illustrative quotes are summarised for each principle in table 2). We then reflect on the findings in light of people-centred health systems within the discussion.

Box 1 Ten Principles of Health Systems Resilience in the Context of COVID-19 Response

<b>Principle 1</b> Develop flexible pathways for medical supplies
<b>Principle 2</b> Prioritise a list of essential health services [ <i>and continued provision of quality and equitable routine services</i> ]
<b>Principle 3</b> Build trust with local communities
<b>Principle 4</b> Foster good communication at all system levels
<b>Principle 5</b> Support, recognise and encourage staff
<b>Principle 6</b> Facilitate rapid resource flow and greater flexibility in its use
<b>Principle 7</b> Ensure agile tracking of health information
<b>Principle 8</b> Cultivate effective partnerships and networks
<b>Principle 9</b> Structures and mechanisms for advanced preparedness ( <b>New principle</b> )
<b>Principle 10</b> Adapt governance and leadership structures to facilitate timely decision-making and effective coordination of response ( <b>New principle</b> )

Table 2 Illustrative quotations from Liberia and Merseyside related to each FCDO Principle

Principle	Quotations
<b>Principle 1: Develop flexible pathways for medical supplies</b>	<p>“Supply chain are affected greatly because their concentration is on how to provide the COVID response activities meaning the ...medicines and medical supplies that are needed [for] NTDs (Neglected Tropical Diseases), lack of attention will now be paid to that.” (LIB national decision maker 029)</p> <p>“With regards to PPE, there was national guidance about what we should do and there was a huge amount of fear amongst nurses and medics and everyone else understandably. Everyone was scared. I was scared. If someone said they weren’t scared, then they’re lying or they’re a fool. The national guidance was confused, and availability of PPE fluctuated. Procurement here [NHS hospital] did a very good job, but sometimes it just wasn’t delivered nationally. And we went through other supply chains...” (LIV hospital decision maker, Merseyside UK 014)</p>
<b>Principle 2: Prioritise a list of essential health services [and continued provision of quality and equitable routine services]</b>	<p>“So we just have to be robust and do the necessary investment into routine health services, preventive in terms of creating awareness and education among health workers about covid and how we can continue to care for our patients, with fighting the infection at the same time.” (LIB national decision maker 001)</p> <p>“There’s the whole big risk around the screening program...the screening program was stopped, restarting that it’s gonna be really challenging. And I suppose that’s another risk in terms of people with delayed diagnosis and the right treatment, as a result of not having had that screening mammograms.” (LIV hospital decision maker Merseyside UK 051)</p>
<b>Principle 3: Build trust with local communities</b>	<p>“Some of the useful things that we have been using from Ebola time is, as I said before, to involve the communities ...The community aspect is very important because it will help us for the COVID-19 where communities, family members, all of those at the community level are influential group they will be able to comply like we did in the Ebola.” (LIB national decision maker 005)</p> <p>“The elderly population have been shielding because of comorbidities and all that. I think they probably not being as vocal about things that they’re concerned about because they’re worried about that they will be asked to come in. They fear that that</p>



Principle	Quotations
	<i>they will catch Covid when they come here.” (LIV hospital health worker Merseyside UK 048)</i>
<b>Principle 4: Foster good communication at all system levels</b>	<i>“One of the things that quickly used to come to me is to be able to adapt to working with social media technology and all of that, because that’s the first thing if you have to communicate with people in this manner you need to understand zooming, skyping, how to take notes.” (LIB national decision maker 029) “And there’s so many different sources of information that say different things from what people hear within the hospital talking to friends on the corridor, that you’ve got to come out with a consistent message. And I think it took longer than was ideal to get a central source of information...But people need to be told what the situation is rather than try to be falsely reassured sometimes as well.” (LIV hospital decision maker, Merseyside UK 004)</i>
<b>Principle 5: Support, recognise and encourage staff</b>	<i>“Like take for example, when COVID came some of our workers from the [name] Hospital was recruited to go at the front line and [hospital name] is for routine services so taking employees from there to go at the front line that tells you it kind of understaff... So routine services kind of slow down and every attention was placed on COVID but going forward, with the system in place, routine services have gotten back on its feet.” (LIB national decision maker 010) “And it felt like there was unequal share of knowledge and also an unequal kind of confidence in protective clothing. ... And I think the people that spent the most time with the patient, the patient areas, for instance, the health care assistants and the cleaning staff didn’t have all of the information [at the] beginning or any PPE training.” (LIV hospital health worker Merseyside UK 017)</i>
<b>Principle 6: Facilitate rapid resource flow and greater flexibility in it’s use</b>	<i>“The first thing is, we need ownership by government, ownership is not depending on other countries to provide us the resources, to provide the technical capacity. So that is the best recommendation I would say. The ownership has to be there, resources have to be available and the infrastructure has to be available in terms of being resilient.” (LIB national decision maker 029) “To be honest, it was a fairly novel experience because it was a situation where if we asked we more or less got [funding].” (LIV hospital decision maker, Merseyside UK 004)</i>
<b>Principle 7: Ensure agile tracking of health information</b>	<i>“Another recommendation is that we could include COVID-19 to our regular disease surveillance. Like we have the measles, the Lassa, and thing. I think we should include COVID because COVID maybe all around. Like we included Ebola, there should be a document on COVID-19 that will form part of our regular surveillance.” (LIB county decision maker 024) “...there’s some value in looking at the things that we were looking at before COVID, because at least we have some longitudinal data on that so that we can see what the effect of COVID is.” (LIV hospital health worker, Merseyside UK 020)</i>
<b>Principle 8: Cultivate effective partnerships and networks</b>	<i>“Involvement of multi-sectorial stakeholders in the response; that was one major thing that we learned from Ebola. And that has been brought to be on this response, so there has been a spark from the level of the presidency where they have key ministries and agency heads heading pillars on the COVID-19 response, involving the community people.” (LIB national decision maker 028) “I think one thing, it’s really highlighted is the divide between hospital and primary care. We didn’t work together very well before the epidemic, and we are still not working together very well. And I think if things were to get better, the whole health system needs to work better.” (LIV community-level health worker, Merseyside UK 033)</i>
<b>Principle 9: Structures and mechanisms for advanced preparedness</b>	<i>“If you don’t prepare well and you are caught unaware you will have a lot of issues, so we didn’t wait for COVID to enter Liberia before we prepositioned basic PPE and those are all part of the preparedness phase.” (LIB county decision maker 026) “It was blatantly obvious that anything we’ve ever planned for in relation to a pandemic or anything along those lines was not the plans that we needed... So I think going forward there needs to be almost a better planning system in place...it’s not just</i>

Principle	Quotations
	<i>a matter of just saying any pandemic it's about what kind of pandemic.” (LIV hospital decision maker, Merseyside UK 069)</i>
<b>Principle 10: Adapt governance and leadership structures to facilitate timely decision making and effective coordination of response</b>	<p><i>“So, at this point in time we think if you give the resources, put the money in the hands of the county health team to buy what they need, that will be more effective ... So, we want decision should be given back to the people on the frontline so that they make the decision rather than a centralized point in Monrovia where people sit and decide for people in the lower level and the people choices made the right kind of thing they might need at that level.” (LIB national decision maker 028)</i></p> <p><i>“... we were having to work, to a large extent, in the dark. The amount of guidance that came through nationally and even regionally, was actually relatively limited at that stage and we were having to do what felt like quite a lot of planning in isolation.” (LIV decision maker Merseyside UK 008)</i></p>

Principle 1 Develop flexible pathways for medical supplies: Across both settings supply chains were disturbed due to global shortages and price inflation. In Merseyside there was a lack of personal protective equipment (PPE) and laboratory reagents needed for COVID-19 testing. Meanwhile, in Liberia, the disturbances related to routine supplies as supply chains shifted to focus on COVID-19 related procurement. In both settings, these challenges were felt to relate to global shortages, but were worsened by failure to maintain buffer stocks at local and national levels. In both settings, participants expressed the need for greater decentralisation of procurement decisions.

Principle 2 Prioritise a list of essential health services [and continued provision of quality and equitable routine services]: Participants from Merseyside expressed fears that there was too much emphasis on COVID-19 care, at times creating redundant capacity, while limiting access and quality of routine essential services. The blanket discontinuation of all elective non-urgent care at the height of the first wave in Merseyside, UK was felt to be unhelpful, and a more nuanced approach which seeks to balance long-term as well as short term risks associated with health conditions was recommended. In contrast, Liberia's early emphasis on routine health services was described as a key learning prioritised by decision-making platforms following the country's experience with the EVD epidemic.

COVID-19 adaptations in the UK led to increased telemedicine, with some respondents raising access-related equity concerns, particularly for elderly populations, who may struggle to engage with telemedicine. There were also concerns raised about quality of care, with some participants in

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3 Merseyside fearing delayed-diagnosis, misdiagnosis or sub-optimal care due to restrictions limiting  
4 physical contact with patients. In Liberia, limited opportunities for supervision, diversion of funds and  
5 staff for routine services towards COVID-19 response, and limited community outreach activities (due  
6 to physical distancing) were felt to impact quality of care. Across both settings innovations in service  
7 delivery have emerged (see policy briefs for details).[28,45]  
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15 Principle 3 Build trust with local communities: In both settings, community trust to seek health  
16 services declined, which reduced utilisation of services. In Liberia, fear among the population during  
17 the start of the pandemic led to reduction in the uptake of health services including national routine  
18 vaccination programmes and health facility-based delivery. This was felt to relate to a combination of  
19 fear of contracting COVID-19 at facilities and to reduced community outreach activities. Innovative  
20 community engagement and social mobilization strategies were introduced, for example follow-up  
21 visits to pregnant women, which led to patients returning to use services after a few months. Another  
22 example is the selective outreach home visits by the Neglected Tropical Disease (NTD) programme to  
23 NTD affected patients, in order to avoid interruption in treatment provision. In Merseyside, utilisation  
24 of non-COVID related services remained suppressed for much longer. This was deemed to relate to  
25 widespread community mistrust, and Government campaigns which initially discouraged the public  
26 from visiting health facilities via the national 'Stay at home' messaging. Applying learning from  
27 Liberia's experience with EVD, the Government of Liberia placed a strong emphasis on working  
28 alongside community governance structures, involving local authorities as part of COVID-19 response.  
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47 Principle 4 Foster good communication at all system levels: The need for effective communication  
48 within the health system appeared to be a significant theme, particularly within findings from  
49 Merseyside. The rapidly changing context during the early months of the pandemic created a wealth  
50 of daily new information. Virtual forms of communication rapidly expanded in both settings, with  
51 WhatsApp and online meeting platforms used extensively. Within Merseyside, referred to challenges  
52 such as multiple sources of guidance and communication channels struggling to keep pace with the  
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3 changing guidance, which at times created contradictory messaging and confusion among health  
4 workers. By contrast, Liberia developed a centralised messaging procedure with approval needed  
5 from the department of Health Promotion before dissemination. In Merseyside, use of emails were  
6 typically less popular with staff as these could often be too long and wordy. Participants expressed  
7 limited scope for frontline staff to feedback on the information that had been shared.  
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15 Principle 5 Support, recognise and encourage staff: Staff redeployment was common across both  
16 settings, contributing to varied workloads. In Liberia, health worker redeployment to COVID-19  
17 treatment centres, alongside largely unchanged utilisation rates contributed to increased workload  
18 for remaining health workers responsible for provision of routine services. By contrast in Merseyside,  
19 redeployment resulted in over-staffing in certain COVID-19 wards. Although there was disparity  
20 between health workers, with nurses experiencing increased workload. Due to the reduced volume  
21 of patients seeking routine care in the UK, workload was variable for those providing these services.  
22 The degree to which health workers received training about COVID-19 prior to having to manage  
23 COVID-19 patients varied between settings, with Liberia carrying out training in identification,  
24 isolation and infection, prevention and control before the first case of COVID-19 arrived in country, as  
25 a result of lessons learned following experiences responding to EVD. By contrast in Merseyside, the  
26 roll out of training varied widely by cadre, with some participants identifying that health care  
27 assistants and cleaning staff did not receive PPE training until later in the pandemic, compared with  
28 doctors and nurses (see table 2).  
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47 Anticipated mental health implications for health workers emerged from the Merseyside data, due to  
48 high rates of COVID-19 infection, exhaustion and high future anticipated post-traumatic stress  
49 disorder (PTSD). This was associated with fear of making treatment mistakes, stress surrounding  
50 patient escalation decision making, anxiety over potential COVID-19 infection (both personal and for  
51 family), trauma surrounding high COVID-19 infections and deaths and reduced psychosocial support  
52 due to remote working. Measures to support staff wellbeing were introduced (including counselling,  
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3 reflective therapy, peer support and mentoring, information made available about local support  
4 services), with varied levels of uptake. This was not widely discussed in Liberia. Although measures  
5 in Liberia to support staff wellbeing include psychosocial teams, roaming mental health counsellors  
6 providing services to health workers are in place. In Merseyside, community support, strong solidarity  
7 and teamwork were considered enablers of staff resilience.  
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12 Principle 6 Facilitate rapid resource flow and greater flexibility in its use: Historic underfunding of the  
13 health system in both settings has been highlighted by the pandemic. In Merseyside, this was  
14 considered to be due to nearly a decade of austerity, which has created weariness and uncertainty;  
15 whereas in Liberia it related to perception of reliance on external donors which predated the  
16 pandemic. Our findings confirmed the need for adequate funding to ensure the building blocks of the  
17 health system have received investment prior to the onset of any shock. With the arrival of the  
18 pandemic the availability and flexibility of funding differed between settings. In Merseyside, UK there  
19 was increased central government funding, which was mostly freed of usual bureaucratic checks.  
20 Managers noted that the removal of these bottlenecks allowed for swift action and rapid adoption of  
21 innovations. Frontline managers' ability to make operational decisions was viewed as central to  
22 resilience. In Liberia, however, there was an identified need for greater Government of Liberia  
23 ownership. Some sectors of the health system, particularly those which are donor reliant struggled in  
24 response to reduced partner support following the pandemic. Initially funding was not made  
25 available, however funds for routine service delivery were re-allocated to COVID-19 response, with  
26 implications for quality (see principle 2). Participants complained about excessive bureaucracy  
27 associated with use of funds, which created delays.  
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51 Principle 7 Ensure agile tracking of health information: Health information systems (HIS) were rapidly  
52 developed in the UK to collect huge quantities of surveillance data on COVID-19 and essential services.  
53 However, there was need for improved skills to usefully interpret this data. Respondents in Liberia  
54 stated that regular and timely submission of data, particularly from the community level had declined  
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3 since the onset of COVID-19. This was considered to relate to reduced data validation, with decreased  
4 supervision visits due to physical distancing. In Merseyside complex new systems were designed to  
5 collect pandemic surveillance data, however, data was frequently not analysed or made readily  
6 accessible to staff to influence timely monitoring and quality improvement in services. In Merseyside,  
7 respondents also noted that a number of new initiatives were introduced during the pandemic, such  
8 as virtual consultations, but have not yet been systematically evaluated.  
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17 Principle 8 Cultivate effective partnerships and networks: The need for well-established partnerships  
18 emerged in both settings, with Liberia already having clear multi-sectoral participation in decision-  
19 making following the Incident Management System developed following EVD. Merseyside data  
20 highlighted pre-existing weaknesses in collaboration between primary and secondary/ tertiary care  
21 have been exacerbated. In both settings the need for greater engagement with the private sector  
22 was affirmed, with respondents from UK highlighting the need for stronger links regarding PPE supply  
23 chain shortages and in Liberia the need to strengthen collaboration given perceived weakness in  
24 private facility IPC standards. Partnerships were established within Merseyside, in a range of aspects  
25 of service delivery, including: regional network of laboratory providers to address equipment  
26 challenges and ensure COVID testing; between GPs to create service hubs; between disciplines and  
27 departments within hospital to address staff shortages and share information. In Liberia, a reduction  
28 in the number of partners providing response support was noted. This was a marked contrast to the  
29 EVD response.  
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47 Principle 9 Structures and mechanisms for advanced preparedness (newly identified principle from  
48 our findings): Within Liberia in particular, but also in Merseyside, there was discussion about  
49 advanced preparedness. Respondents in Liberia emphasised how their experiences with previous  
50 shocks, particularly EVD, had facilitated learning around early recognition of the need for  
51 preparedness. For instance, there was consensus among respondents that waiting for COVID-19 to  
52 reach Liberia before responding would be too late. There was early rapid mobilisation of existing  
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3 emergency response systems which had been established during the EVD response including; health  
4 check controls and quarantines at border points from January 2020; health worker COVID-19 training  
5 before the first confirmed case; enhanced hygiene practices; restriction of physical contact and  
6 sustained use of PPE, building on institutional memory gained through the EVD epidemic. In contrast,  
7 respondents in Merseyside expressed that the COVID-19 response was impeded by a lack of pandemic  
8 preparedness for new emerging infectious diseases.  
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12 Principle 10 Adapt governance and leadership structures to facilitate timely decision-making and  
13 effective coordination of response (newly identified principle from our findings): Being able to adapt  
14 governance and leadership structures to facilitate timely response coordination emerged from both  
15 settings. Liberia had previously established the incident management system (IMS) in 2014 as part of  
16 the response to EVD. It was re-activated in March 2020 to guide planning their pandemic response,  
17 led by the Minister of Health. This multi-sectoral team included a range of political and public health  
18 decision-makers, donors and partner representatives. At the time the study was carried out, most  
19 decisions were made centrally, with implementation at county level. In Merseyside, early response  
20 was hindered by slow and centralised guidance and decision-making, which was perceived to be  
21 oriented towards achieving political goals, rather than providing much needed clarity and recognition  
22 of local reality. The limited scope for local autonomy was considered to strain relationships between  
23 local senior leadership who sought to enforce central directives, and frontline staff, who wanted scope  
24 to influence them. In both settings, there was interest in greater de-centralisation of decision-making  
25 to lower levels.  
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## 49 **Discussion**

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52 Our findings indicate that a resilient health system is a people-centred health system (Figure 2).  
53 Maintaining a people-centred approach can help ensure that COVID-19 related adaptations are  
54 acceptable, understood and meet the needs of individuals (both patients and health workers). The  
55 values which underpin people-centred health systems emphasise the need for equity, orienting health  
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services towards a health system which puts “people and communities at their centre, and surrounds them with responsive services that are coordinated both within and beyond the health sector, irrespectively of country setting and development status.”(page 9 [14])

### Adapting a people-centred framework

#### *Box 2 Recommendations from our adaptation of FCDO principles*

1. Supply chains should pre-position adequate stocks, diversify sources and seek decentralisation of procurement. Collaboration between providers can prove valuable in securing continuity of supplies.
2. Routine services should be prioritised with a view to long term as well as short term impact, with prioritisation re-evaluated regularly as the pandemic progresses.
3. Maintain consistent communication and engagement with community leaders as partners to participate in pandemic planning within their respective communities.
4. Keep communication channels open, with regular updates for staff which highlight the key information, preferably through meetings, rather than email.
5. Ensure adequate provision of training, with sufficient PPE for health staff particularly for those staff at highest risk of COVID-19 infection, alongside measures to balance workload and promote staff wellbeing. Prioritise compassionate leadership which is supportive of staffing levels and rotas, along with staff mental wellbeing. Investment in psychosocial wellbeing throughout and after the pandemic response.
6. Health systems need to be adequately funded during ‘normal times’ if they are to be able to respond when a shock arises. There is urgent need for investment to clear the backlog of delayed routine services.
7. Health information systems need greater investment in both the systems and the human element to be able to analyse, interpret and respond to emerging data trends.
8. Opportunities for multisectoral collaboration should be sought out, with engagement with private sector where possible.
9. Develop a proactive approach, with advance plans for health shocks, along with escalation and de-escalation plans throughout the crisis.
10. Promote greater opportunities for de-centralised staff involvement in decision-making where feasible. Governments to prioritise an outward focus towards global solidarity.

All ten principles are mapped against the original conceptual framework, to demonstrate the connection between our findings and existing literature about resilience (Figure 2) and recommendations in response to each principle are outlined in box 2.

Figure 2 placed here



### Capacity and knowledge exchange

The continuation of routine essential service delivery following a shock to the health system, has previously been highlighted as an area of concern across a range of sectors.[46,47] Health systems need the capacity to continue to deliver services of good quality alongside responding to wider health challenges.[41] Our findings for principle 2 highlighted that COVID-19 adaptations in the UK led to the cancelling or postponing of many essential services, including those related to cancer care, which has been anticipated to decrease life expectancy and survival.[47,48] Meanwhile, Liberia emphasised the need for continuation of routine services and the promotion of patient confidence to use these services. This is in contrast to the EVD epidemic, where over 80% reductions in maternal delivery care in EVD affected areas were described and form part of the reason why routine care was prioritised so strongly as part of the COVID-19 response.[49]

Our findings relating to supply chain (principle 1) resonate with literature from previous shocks and research emerging from the COVID-19 pandemic.[50,51] We found the need for greater flexibility, with engagement with a more diverse range of suppliers and greater decentralised control over supply chain across both settings. This is in keeping with a recent systematic review of supply chain resilience literature, which identified the importance of diversity and the social aspects of supply chains during a pandemic response.[50] Supplying commodities without investing in health systems strengthening will not produce a robust supply chain, limiting ability to respond quickly and effectively to future demands.[50]

We found a strong focus on the need for support for the health workforce, particularly in UK (principle 5). This was not as widely discussed in Liberia (though this may be a limitation relating to differing levels of participants between countries). However, a previous study in Sierra Leone and Liberia, highlighted that many providers may carry unresolved trauma from earlier shocks (including the Ebola epidemic), which may have implications for them during the COVID-19 response.[52,53] Research among health workers treating patients with COVID-19 in China, revealed health workers had a higher

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3 prevalence of insomnia, anxiety, depression, somatisation and obsessive-compulsive symptoms  
4 compared with nonmedical health workers, indicating the need for support and recovery programs  
5 for these staff.[54] Stressors identified among workers in China, include many of those described by  
6 participants in both settings within our study, particularly within Merseyside, including difficulties  
7 feeling safe at work, lack of infection prevention and control (IPC) measures and COVID-19 knowledge,  
8 long term workload, high risk of exposure to COVID-19, shortage of PPE and lack of rest, among  
9 others.[54]

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11 Our findings regarding resource flow to frontline providers (Principle 6), are in keeping with previous  
12 study which identified funding as a core dimension within a health systems' ability to adapt and  
13 respond to shocks.[55] A recent systematic review found aggregate public spending for health is  
14 associated with improved life expectancy, reduced child and infant mortality and more equitable  
15 health outcomes.[51]

### 31 **Relational and teamwork components**

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33 The relational components which exist are shaped by risk, trust, values, power, norms, and  
34 culture.[41] These components play a role in determining the success (or failure) in response to a  
35 health systems shock or crisis. In contrast to the FCDO recommendation for good communication  
36 between actors (principle 4), our findings highlight challenges, particularly in the UK, where  
37 communication channels struggled to keep pace with changing guidance creating contradictory  
38 messaging and confusion among health workers. This is in keeping with previous study which found  
39 differences in lines of authority and acceptability of communication pathways can contribute to  
40 problems in communication.[33] In response, key principles were identified including participation  
41 for all, respect, information sharing, collaboration and problem-solving.[33]

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43 The need for strong governance structures and leadership which adapts to the response (principle 10),  
44 was identified as a gap within early response in Merseyside. This was felt to have been hindered by  
45 slow and centralised guidance and decision-making with a perceived limited scope for autonomy  
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3 within decision-making at lower levels. Within Liberia learning from the EVD response, and  
4 establishing an incident management system (IMS) (led by the Minister of Health) and Special  
5 Presidential Advisory Committee on Coronavirus (SPACC) (led by the President) early in planning their  
6 pandemic response enabled timely decision-making.[26] In both settings, there was interest in greater  
7 de-centralisation of decision-making to lower levels. Blanchet et al (2017) emphasised the need for  
8 legitimacy within resilience, with requirement of capacity to develop socially and contextually  
9 accepted institutions and norms.[39]

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11 Looking more broadly, the conceptual framework highlights community engagement, with the  
12 community being active participants of any health systems response (principle 3).[38] Our findings  
13 emphasise the value of community engagement within the response within Liberia, based on lessons  
14 from the EVD pandemic and in keeping with WHO recommendation that this be a key pillar within  
15 COVID-19 country response.[8] Liberians across all socio-demographic groups responding to a recent  
16 survey said they were very well, or somewhat well informed about the COVID-19 pandemic, with only  
17 5% feeling not very well/ not at all informed.[26] This also emerged as a key finding in Singapore, with  
18 engagement through new and social media channels monitored, with clarification of misinformation  
19 by MOH.[56] In contrast to the findings from Liberia, participants from Merseyside highlighted the  
20 need for stronger communication (although there were some examples of creative ways to engage  
21 with diverse communities).

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23 Learning from our study has emphasised the need to better prepare for, and respond to, health  
24 emergency crises through integrated services (Principle 9).[43] A recent survey found most of the  
25 population felt the Liberian government was doing well in managing the pandemic.[43] This  
26 contrasted with findings from the UK where there was felt to have been a lack of adequate advance  
27 planning and preparation. Two previous literature reviews highlighted that “preparedness depends  
28 on health systems ability to learn from prior pandemics”, with responses often reactive rather than  
29 proactive.[51,57]

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3 The people-centred approach stresses the need for awareness and recognition of the  
4 interdependencies of the health system with the community and other social systems, including  
5 education, social protection and food security and their relationship with social determinants of health  
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10 (principle 8).[58] Our findings emphasise the need for strong partnerships with other sectors across  
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12 settings, in keeping with an identified success in Singapore's response,[56] and is a key aspect of  
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14 Blanchet et al.'s resilience framework, ensuring the capacity to engage with and handle multiple actors  
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16 and dynamics.[39]

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19 Our findings, particularly from Merseyside emphasise the vast quantities of data being generated  
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21 through the COVID-19 response, but there are gaps in how this data is analysed and utilised within the  
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23 health system. The importance of adequate HIS is in keeping with previous studies.[39,55] A health  
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25 system's ability to identify and respond to an emerging threat is needed if it is to appropriately meet  
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27 emerging needs during a rapidly evolving health crisis or shock (principle 7).[39,40] A robust health  
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29 management information system (HMIS) is crucial to a health systems capacity to respond to  
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31 shock.[55] Health systems need to have the ability to combine and integrate different forms of  
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33 knowledge and to anticipate and cope with uncertainties and unplanned events.[39]

### 34 35 36 37 38 **Reflections on the need for global solidarity within pandemic response**

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41 The COVID-19 pandemic has emphasised the need for global collective action, rather than an  
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43 individual response for there to be genuine resilience, with COVID-19 having reflected and  
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45 exacerbated existing social inequalities.[8] 'Global powerhouses' and 'so-called' advanced  
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47 democracies' have struggled in their response to COVID-19 due to a failure to adequately adopt  
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49 people-centred approaches within the response, with reductions in the quality of governance and a  
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51 lack of commitment to equity in health service delivery and supporting health workers' wellbeing.[8]  
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53 Excessive self-interest and a lack of global solidarity on the part of some richer countries, particularly  
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55 with regards to vaccination are dominating the current phase of the pandemic (September 2021). The  
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57 hoarding of vaccinations by some richer countries, while health workers and vulnerable populations  
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3 elsewhere remain unvaccinated has been widely criticised from both a moral perspective, and from a  
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5 scientific one, since “until we’re all safe, none of us is safe”.[59]  
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### 8 **Strengths and Limitations**

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11 The strengths of this study include the quality of data analysis, which involved a wide range of  
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13 researchers across both settings, and the breadth of perspectives captured from frontline staff and  
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15 key decision-makers early in the course of the pandemic. Our study had a number of limitations.  
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17 Within Merseyside, study participants were selected from across a range of health system levels  
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19 including primary care, hospital frontline workers and decision-makers as well as regional decision-  
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21 makers. By contrast, in Liberia participants included national and county level decision-makers,  
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23 technicians and supervisors of frontline staff, with no direct frontline workers included. This may  
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25 result in some of the differences in findings, related to these differing perspectives. Perhaps the  
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27 greatest limitation of this study is that it was carried out at a single point in time. In Merseyside we  
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29 collected data towards the end of the first wave, at a time when there were few inpatients and people  
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31 were reflecting on the first wave. Meanwhile in Liberia it was carried out before there had been a  
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33 large increase in cases. Since the study was carried out there have been subsequent even greater  
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35 waves of cases within Merseyside, UK and Liberia has experienced a large surge in cases of the delta  
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37 variant (59% of cases recorded in Liberia up until 17<sup>th</sup> July 2021, occurred during a six week period  
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39 from June 1 2021 to 17<sup>th</sup> July 2021).[60] By the weeks beginning July 24<sup>th</sup> to August 7<sup>th</sup> 2021 number  
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41 of confirmed cases had declined between zero to 43. Response measures have evolved in both  
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43 settings, and limitations identified through the study may have been addressed in subsequent stages  
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45 of the pandemic.  
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### 51 **Conclusion**

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54 We found the ability of health systems to be able to absorb, adapt and transform in response to the  
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56 COVID-19 pandemic in two very different settings closely relates to the eight FCDO principles of  
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58 resilience.[16,39] We expanded these principles to include strong structures and mechanisms for  
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3 advance preparation, and adaptable governance and leadership structures to facilitate timely  
4 decision-making and response coordination. At the heart of our findings lies the centrality of the  
5 people-centred health system, where the person, is placed within their family, community and the  
6 health system.[14] When all aspects work together the outcome is the extent of resilience  
7 demonstrated within a health system in response to shock.[39] This includes both the provision of  
8 specific services in response to the shock experienced, as well as continued provision of and demand  
9 for 'routine care'. Our study highlights the need to maintain a people-centred approach for a resilient  
10 health system response.  
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### 45 **Competing Interests**

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47  
48 None declared.  
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### 50 **Author Statement**

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54 RM prepared the first draft of the paper with inputs from all; Study design, conceptualisation, ethics  
55 (ST, LD, MT, LF, IB, ZZ, RM, VW, HP, RAdC, RH, KK); conducted interviews in UK – RM, VW, MT, KO, HP,  
56 SC, ST, TEH, RH, RD, YD, OH; conducted interviews in Liberia - ZZ, WT, HB, JK, JSS, CP, GZ, RM. All  
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3 interviewers participated in the cross-country analysis which was led by YA in the UK with inputs from  
4 those who conducted UK interviews and LD, RM, ZZ, HB, WT, JK, JSS, GZ, CP in Liberia. All authors were  
5 involved in critical review of the approach, inputted into and approved the final draft of the  
6 manuscript.  
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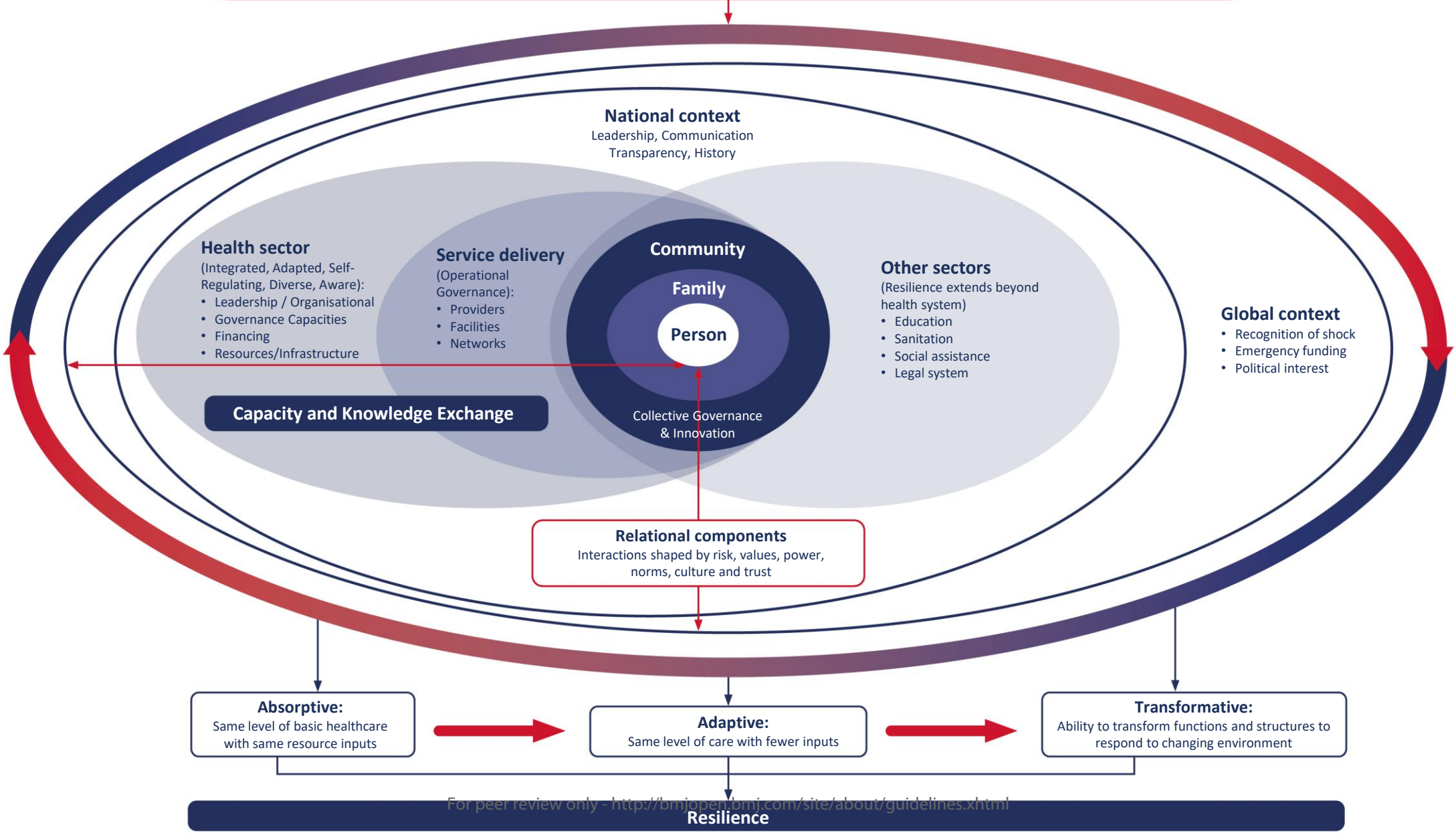
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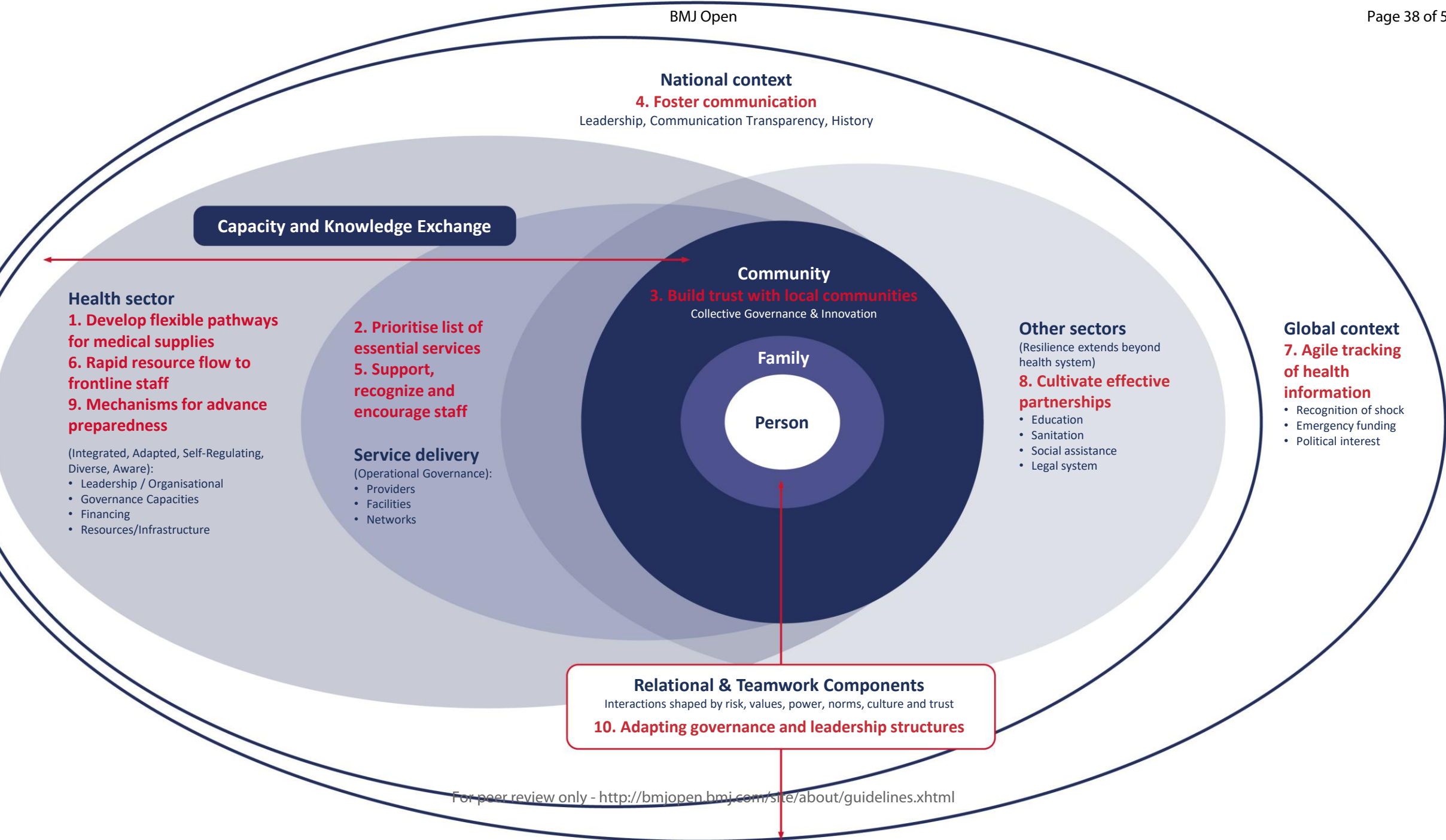
**NATURE OF THE SHOCK - CONFLICT, TERRORIST ATTACK, INFECTIOUS DISEASE OUTBREAK, NATURAL DISASTER, FINANCIAL, MIGRATION, CLIMATE CHANGE, CHRONIC CHALLENGES, OTHER**



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Appendix 1: COVID-19 Key Informant Interview Topic Guides

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For peer review only

## Key Informant Interviews Topic Guide –MOH Liberia

All possible questions to be asked of key informants are described in the following guide. Prior to interviewing each stakeholder, specific guides for these individuals will be made. One interview that covers relevant research themes will be completed with each stakeholder. Ordering of questions will also be revised to ensure logical flow through the interview and to avoid repetition.

### Background

Please can you tell me your position and how long you have worked in your current role?

How has your role changed due to the current COVID-19 crisis?

### Responses to Shock and the General Health System

1. How do you think the health system has coped with the COVID-19 crisis? How did it compare with previous crisis? How have routine services been impacted?
2. How is the current shock (COVID-19) the health system is experiencing similar or different to those you have experienced before?
3. What are the key learnings from previous shocks (Ebola/ conflict/ economic crisis)? How are they being used to respond now?
4. How do you think routine health systems functions are being impacted by the current crisis (COVID19/economic)?
5. What do you think could be done to support continuation of routine services? How is this informed or shaped by learnings from during the Ebola period?
  - a. How would you describe the quality of services usually? How is quality of care being maintained throughout the COVID-19 response?
6. What policy or guidelines are supporting with the current COVID response? What additional guidelines or policies could be helpful for the COVID response?

### Service Specific Impacts

**Questions in this section to be reviewed/modified for cross-cutting MOH functions, e.g. M&E, research division prior to starting interview**

7. Can you tell me about how service delivery within your programme/section (adapt to include name of section depending on who talking too) has been affected by the COVID pandemic?
  - a. Which of your services would you say have been most impacted so far? Why?
  - b. Which services would you envisage will be most impacted moving forwards? Why?
8. How have your routine services been modified or adapted? Which components of your service do you view as essential? Why?
9. Which specific sub-populations is routine care most impacted for? Are there any marginalised groups who may struggle to use services since the onset of the COVID-19 crisis? (Probe: e.g gender, dis/ability, rural/urban; wealth; geographic regions; age etc)
10. Have there been any innovations within service delivery in response to the COVID-19 crisis, and have they been useful in any way?
11. Has there been any innovations in response to COVID-19 that have concerned you?

### Human Resource Management

12. How have you planned for staffing to meet the changing additional workload in response to COVID? Any tools/ guidance from the human resource section? Successes and challenges? (Prompt for role of new community health cadres, for those providing face to face care and for MOH staff)
13. What additional skill development have you provided and how in response to COVID? Successes and challenges?
14. How are you able to support staff so they can continue to work effectively during the COVID pandemic
  - a. How have you supported staff through communication?
  - b. How have you supported staff for occupational safety including PPE?

COVID-19 Key Informant Interview Topic Guides

- c. How have you supported staff through with psychosocial support?
- d. What have been the successes and challenges with supporting staff?

### **Service and System Impacts: Governance and Decision Making**

**Questions in this section to be reviewed/modified to make these questions more service-specific, depending on the interviewee's programme area**

15. How are decisions made about which services should or should not be prioritised as part of the COVID response? (prompt for in relation to their specific service and also in relation to general health system, prompt for donor influence)
16. How does decision-making as part of the COVID response influence routine planning activities? What has been the impact of resource re-distribution as part of the COVID response?
17. Who is involved in this decision making and what are the processes? What are the challenges?
18. What do you think are the key ethical impacts of making these decisions? What ethical guidelines are currently in place and important in decision making during this period?
19. What guidance documents are available to support you in making decisions regarding COVID?
20. What guidance documents would help to support maintaining routine services?

### **Closing Questions**

21. What does a resilient health system look like to you? What are your three recommendations would you make to improve or maintain the resilience of the Liberian health system during this period?
22. What are your three recommendations would you make post crisis to ensure the return to routine function of the health system as effectively as possible?

Additional questions for Director of personnel only

23. What are the main sources of additional staffing (e.g. secondment/redeployment, task-shifting, improved productivity, early graduation/students, returnees, volunteers)? Successes and challenges? Optional: Impact on the wage bill?
24. What areas of service are now struggling with staffing?
25. What are you able to do to retain staff? Successes and challenges?
26. What impact did/is down-sizing of "non-essential staff" have on your programme during the crisis?

Thank-you

Any other comments?

## Key Informant Interviews Topic Guide –Merseyside Regional Decision Makers

### Version 1.1\_01052020

All possible questions to be asked of key informants are described in the following guide. Prior to interviewing each stakeholder, specific guides for these individuals will be made. One interview that covers relevant research themes will be completed with each stakeholder. Ordering of questions will also be revised to ensure logical flow through the interview and to avoid repetition.

### Question List

#### Background

Please can you tell me your position and how long you have worked in your current role?

#### Impact of COVID 19 on Routine Service Delivery

1. What are defined as essential routine services?
2. Which are the main scheduled and unscheduled services affected by COVID-19 and how have these been adapted over time?
3. Have there been any innovations within service delivery, and what have these been?
4. Have there been any changes that have concerned you? Why?
5. What would help to support maintaining routine services?

#### Governance and Decision Making

6. What has informed your decision-making, such as guidance documents or governance decision-making processes?
7. Who is involved in decisions made about which services should or should not be prioritised?
8. How are decisions made about which services should or should not be prioritised?
9. Describe how and who is involved in operationalising decisions?
10. What challenges have you faced in making these decisions?
11. What are the main differences between various sites in the trust, especially between Aintree and the Royal Hospitals?
12. How are changes in service delivery communicated? How can this be improved? There are multiple guidelines at national and local levels, how are these disseminated? How well does this work? How rapidly? How do health care workers respond to these changes?

#### Human Resource Management

13. How have you [may be the employer in general] planned for staffing to meet the changing additional workload? Any tools/ guidance from national authorities? Successes and challenges?
14. How have you planned for the increase in staff absence?
15. What additional skill development have you provided and how? What have been the successes and challenges?
16. How are you able to support staff so they can continue to work effectively (e.g. communication, occupational safety including PPE, psychosocial support)? What have been the successes and challenges?

#### Recovery post COVID-19

17. Are there any COVID-19-related changes to routine health services that you think it would be useful to continue after COVID-19? Which ones and why?
18. What next steps do you believe should be taken now to support the health system to recover post COVID-19?

## COVID-19 Key Informant Interview Topic Guides

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Thank-you  
Do you have any further suggestions for improvements to delivery of routine services?  
Any other comments?

For peer review only

## Key Informant Interviews Topic Guide – Health Workers

### Version 1.1\_01052020

All possible questions to be asked of key informants are described in the following guide. Prior to interviewing each stakeholder, specific guides for these individuals will be made. One interview that covers relevant research themes will be completed with each stakeholder. Ordering of questions will also be revised to ensure logical flow through the interview and to avoid repetition.

### Question List

#### Background

Please can you tell me your usual position and how long you have worked in that role?

Are you currently working in your usual role and department?

If no, what role and department are you now working in?

#### Impact of COVID 19 on Routine Essential Service Delivery

1. Can you tell me about how health service delivery has been affected by the COVID pandemic? What was the processes for this, how was it communicated and do you have any ideas about how this can be improved? How prepared did you feel for these?
2. What do you consider to be routine essential health services in your work?
3. Which are the main scheduled and unscheduled services affected by COVID-19 in your department and how have these been adapted over time?
4. What have been the strengths and challenges with these changes? How has quality been affected?
5. How should these changes be evaluated? What indicators should be used?
6. What is worrying you most about your service now?
7. Which services would you envisage will be most impacted moving forwards as the pandemic progresses? (e.g. hospital based, community care, disease specific services, etc) Why?
8. Who do you think are the people most impacted by the changes in routine service delivery? Would you say that patients with specific socio-demographic characteristics are more impacted by service disruption/distortion than others? Why? (e.g. gender, dis/ability; rural/urban; wealth; geographic regions; age etc) What can be done to ensure that these patients can still use health services when they need them?

#### Ethics and Decision Making

9. Have you encountered any health systems issues which you found troubling since the start of the COVID-19 pandemic? Would you be willing to tell me more about these issues?
10. What is the impact of these issues on you as a health worker? What would be helpful to support you in dealing with these issues?
11. Do you know of any ethical guidelines in place to guide you as you make difficult decisions during this time? What are these? How are these ethical guidelines operationalised? Are they useful?
12. Have you been involved with making decisions about the changes to health services since the COVID-19 pandemic? What was your role in making these decisions? How were these decisions made?
13. When there are changes in how health services are delivered how are these communicated with you? How has this worked? What do you think is the best way to be informed?

#### Human Resource Management

14. How has your role changed since the start of the COVID-19 pandemic? What have been the successes and challenges with how your role has changed? Probe workload
15. Is there anything about your role that concerns you? What?
  - a. Probe working outside are of expertise
  - b. No indemnity if make an error
  - c. Communication about working across disciplines

## COVID-19 Key Informant Interview Topic Guides

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3 16. What preparation for the changes to your role have you had and how was it delivered (skills - key ones,  
4 psychological support)? What have been the successes and challenges?  
5 a. Probe PPE training  
6 b. COVID clinical training  
7 c. Support mechanisms  
8 d. Team formation  
9  
10 17. What kind of support (e.g. communication, occupational safety including PPE, psychosocial support) are  
11 you receiving to do your job from your team/manager/employer? What have been the successes and  
12 challenges?  
13

14 **Recovery post COVID-19**

- 15 18. Are there any COVID-19-related changes or innovations to routine health services that you think it would  
16 be useful to continue after COVID-19? Which ones and why?  
17 19. What next steps do you believe should be taken now to support the health system to recover post COVID-  
18 19?  
19 20. What is worrying you most as the response moves forward?  
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22 Thank-you

23 Do you have any further suggestions for improvements to delivery of routine services?

24 Any other comments?  
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## Key Informant Interviews Topic Guide –Merseyside Laboratory and Blood Transfusion Staff

### Version 1.1\_01052020

All possible questions to be asked of key informants are described in the following guide. Prior to interviewing each stakeholder, specific guides for these individuals will be made. One interview that covers relevant research themes will be completed with each stakeholder. Ordering of questions will also be revised to ensure logical flow through the interview and to avoid repetition.

### Background

Please can you tell me your position and how long you have worked in your current role?

### Governance and Decision Making - Relating Directly to COVID-19

1. What has been the decision-making process for the laboratory's response to COVID-19 testing services and when did discussions start around re-adjusting services for COVID-19?
2. Who held overall responsibility for how COVID-19 testing was going to be conducted at LCL?
3. In addition to PHE, have the Liverpool Clinical Laboratory services worked closely/ collaborated with any other external partners for COVID-19 testing? If so whom and in what capacity?

### Governance and Decision Making - Relating to Maintaining Routine Service Delivery

4. How are decisions made about which services should or should not be prioritised; which ones were considered to be essential and why? Who is involved in this decision making? How were these decisions communicated?
5. What guidance documents were most useful to you in making these decisions? In what way were they useful?
6. What key challenges have you faced in making these decisions? Do you have any support needs here?

### Impact of COVID-19 on Routine Laboratory Service Delivery

7. Can you tell me about how routine clinical laboratory service delivery has been affected by the COVID pandemic?  
COVID-19 Testing service specific
8. How did the laboratories adapt to scale up COVID-19 testing? (analysers, staff capacity, staff training, standard operating procedures, risk assessments)
9. What challenges did the laboratory face when implementing COVID-19 testing? How were they overcome? What worked well? (e.g. resources, human resource, process change, governance, culture, leadership etc)
10. Which routine services would you envisage will be most impacted moving forwards? (e.g. hospital based-testing, disease specific services, etc) Why?

### Recovery post COVID-19

11. Are there any COVID-19-related changes to the laboratory service that you think it would be useful to continue after COVID-19? Which ones and why?
12. What next steps do you believe should be taken now to support the laboratory system to recover post COVID-19?
13. Are there any changes/ innovations introduced in response to COVID-19 changes which you think should be continued? Why?

Thank you

Do you have any questions for me? Resources (re labs) link <https://www.rcpath.org/uploads/assets/90111431-8aca-4614-b06633d07e2a3dd9/Guidance-and-SOP-COVID-19-Testing-NHS-Laboratories.pdf>

COVID-19 Key Informant Interview Topic Guides



## Area D\_Protocol

### Optimising COVID-19 adaptations for ethical, equitable and quality delivery of essential health services and more resilient health systems

Investigators/research team: Professor Sally Theobald (LSTM); Karsor Kollie (MOH Liberia); Professor Imelda Bates (LSTM); Professor Miriam Taegtmeier (LSTM); Dr Laura Dean (LSTM); Dr Lucy Frith (UoL). Dr Joanna Raven (LSTM); Dr Rachel Tolhurst (LSTM); Dr Kim Ozano (LSTM); with inputs from Taghreed El-Hajj (LSTM); Yan Ding (LSTM); Natasha Price (LSTM); Helen Piotrowski (LSTM); Russ Dacombe (LSTM); Victoria Watson (LSTM); Rozi McCollum (LSTM); Shahreen Chowdhury (LSTM), Abiola Aiyenigba(LSTM); Rachel Anderson de Cuevas (UoL); Deborah Nyirenda(LSTM/Malawi Wellcome); Nic Desmond (LSTM/Malawi Wellcome).

Research analysis team: Professor Sally Theobald (LSTM); Karsor Kollie (MOH Liberia); Professor Imelda Bates (LSTM); Professor Miriam Taegtmeier (LSTM); Dr Laura Dean (LSTM); Dr Lucy Frith (UoL); Victoria Watson (LSTM); Rozi McCollum (LSTM).

#### Terminology

Essential health services: These include services which seek to prevent communicable diseases, to avert maternal and child morbidity and mortality, to prevent acute exacerbations of chronic conditions by maintaining established treatment regimens, and to ensure timely management of emergency conditions (1).

Resilient health system: "the capacity of health actors, institutions, and populations to prepare for and effectively respond to crises; to maintain core functions when a crisis hits; and, informed by lessons learned during the crisis, to reorganise if conditions require it." (2).

#### Background and Rationale

##### COVID-19 Overview

As of 24th April 2020, there have been 2,726,194 confirmed coronavirus cases globally, with 191,074 deaths. The UK has had 138,078 confirmed cases and 18,738 deaths, while Liberia has experienced 101 confirmed cases with 8 deaths to date (3). The actual number of cases and COVID-19 related deaths is anticipated to be much higher than those confirmed. Across the world, the COVID-19 pandemic has brought the need for re-structuring of health, social and economic systems. While SARS-CoV-2 does not discriminate, the risks of COVID-19 disproportionately affect vulnerable populations (4).

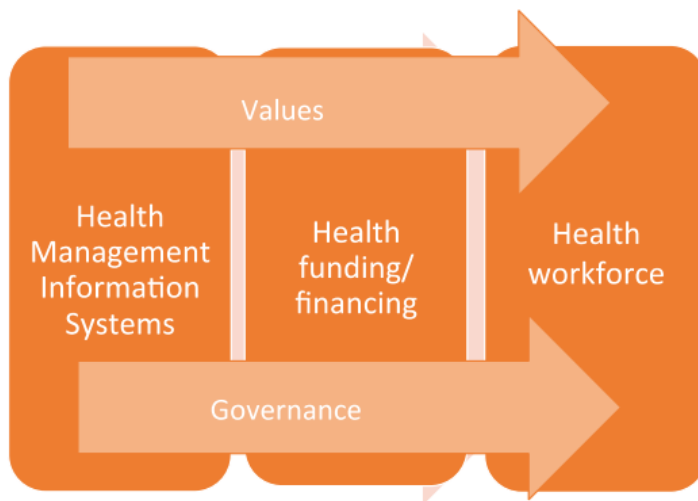
In the UK, the COVID-19 pandemic has led to the re-organisation and delivery of health services, in order to 1) Free up available resources (health workers, hospital beds, equipment etc.) for the management of COVID-19 patients requiring hospitalisation and 2) Protect patients and staff from unnecessary physical contact, with associated risk of infection.

The WHO has issued guidance surrounding the re-orientation of health services in response to the COVID-19 pandemic and recommends that essential health services include: services needed for essential prevention of communicable diseases; services related to reproductive health; care for vulnerable populations; provision of medications for the ongoing management of chronic disease (including mental health conditions); continuity of critical inpatient therapies; management of emergency health conditions; auxiliary services, including diagnostic imaging, laboratory and transfusion services (1). As health systems adapt and respond to COVID-19, while still delivering services for all citizens, previous experiences from the West African Ebola epidemic encourage us to review whether citizens and health care workers have the opportunity to inform decision-making around adaptations and whether changes introduced are acceptable to health care workers and for those most vulnerable, to engage with the health system when they most need care. Studies from a range of prolonged crises, including economic shocks, climate change disasters, disease outbreak and refugee influx, have revealed that inequalities typically grow during a crisis (5). Seeking to understand and review these adaptations as they roll out, we hope will help identify barriers to patients' use of quality, acceptable health services.

##### Health systems resilience during crisis

In addition to traditional health systems dimensions such as health and management information, funding mechanisms and health workforce, these factors were found to be shaped by two cross-cutting dimensions 'values and beliefs' and governance (5), see figure 1.

Figure 1 Learning from shock: a new approach to health systems resilience (Hanefield et al., 2018)



### Decision-making

The National Institute for Health and Care Excellence (NICE) has issued guidance algorithms to assist clinicians with decisions surrounding critical care bed admission for patients with COVID-19, however, these do not take into consideration resource limitations or how clinicians should face decisions if the needed resources are not available (6). The British Medical Association (BMA) and Royal College of Physicians (RCP) have provided briefing notes for health workers, highlighting some of the anticipated ethical dilemmas and providing guidance for workers facing these choices (7,8). While acknowledging the ethically challenging nature of these decisions, health workers are advised of the need to be prepared to modify their practice, so that decisions have a greater focus on public health population ethics, with a basis on utilitarian considerations for how to maximise overall benefit, rather than individual need (7). Health workers have highlighted that this raises the potential for “moral injury”, if they need to make decisions based upon limited availability of resources, rather than need for care (9).

When healthcare services are suspended or reconfigured, how prioritisation decisions are made and the extent to which health workers delivering these services and people using these services are involved with the decision-making process and/or are agreeable with these adaptations are of importance for their acceptability and ultimately whether these services are equitably used (or not). In light of the re-orientation of health services, many clinicians are concerned about their usual patients, including whether these patients are able to access services when needed for both essential emergency and routine care.

Periods of stress, such as conflict and natural disasters, have been shown to increase the occurrence of cardiovascular events (10), with heart attacks and strokes up to two to three times more common during an emergency than in pre-emergency circumstances (11). However, patient use of essential health services has reduced, with many non-emergency services described as ‘eerily quiet’ (12). Within Merseyside, health workers have observed much lower patient attendance to hospital for non-COVID-19 illnesses. Data from New York during the COVID-19 pandemic indicates that cardiac deaths have surged to 400% during the current pandemic compared with the usual number (13). The cause for the underlying increase remains unconfirmed, but is likely to be a combination of undiagnosed COVID-19 cases, delayed health care seeking and increased cardiovascular events (CVE) during emergency situation. Early reports in the UK, indicate that patient deaths due to cardiovascular conditions are much higher than anticipated, and thought to relate to patient reluctance to seek health services (14). In light of the increased burden of cardiovascular events alongside COVID-19, the need for comprehensive and acceptable care for patients with chronic diseases is more important than ever.

Despite re-organisation to maximally utilise resources, there is the potential risk that the health system will be stretched beyond capacity, resulting in gaps in availability of personal protective equipment (PPE), intensive care unit (ICU) beds, antigen test for COVID positive patients and appropriately skilled health workers. This brings ethical dilemmas and stress for all affected health workers. Health workers in leadership positions, may bear additional responsibility for some of these decisions, and often feel a weight of responsibility for the wellbeing of more junior staff members.

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3 Repeated gaps in provision of PPE, leaves frontline health workers faced with the decision of whether to treat  
4 patients and risk their own health or refuse to treat patients. Representative groups for frontline health workers,  
5 including the BMA and Royal College of Nurses have issued guidance to their members that they should not feel  
6 pressured into exposing themselves to unreasonable risk where they have not been provided with appropriate PPE  
7 (7,15). Yet, health workers will undoubtedly face immense ethical dilemmas when deciding whether to continue  
8 providing care, despite inadequate PPE. Media coverage has highlighted multiple stories about health workers  
9 who highlighted the lack of PPE, yet who made the decision to continue to treat their patients and who ultimately  
10 died (16).  
11

### 12 **Restructuring of health services in Merseyside, UK**

13 Within Merseyside, hospital level essential services have been completely restructured and designated coding  
14 according to a traffic light system, in order to appropriately cohort care of COVID-19 patients and allow essential  
15 services to continue whilst minimising infection of COVID-19 negative patients within the hospital setting. The  
16 areas are colour coded as follows:  
17

- 18 • White: These areas are designated for patients presenting with no COVID symptoms, for example,  
19 patients seeking care for minor injury or for management of chronic care/surgery or ongoing health care  
20 needs. Ideally, patients seeking services in these areas would be able to enter directly to the 'white area'  
21 without first having to pass through a 'yellow' area.
- 22 • Red: These areas are for patients who have tested positive for COVID-19.
- 23 • Yellow: This area is for patients with symptoms suspicious of COVID-19, who are awaiting test results, or  
24 who have a negative test result but a high level of clinical suspicion that they are COVID-19 positive.  
25 Depending on stage of the epidemic about 25 – 50% of patients in a yellow area do not have COVID-19  
26 but are awaiting results (and have potentially been exposed)
- 27 • Green: Patients with COVID-19 symptoms who have tested negative in a yellow area, and for who there  
28 is low clinical suspicion of COVID-19 and patients who have been treated for COVID-19 are have  
29 subsequently been stepped down from a red area. Green patients who develop cough or fever are  
30 reswabbed and returned to yellow areas.  
31

32 Patients moves between areas (as swab results come in or as they recover) are guided by clinical need and  
33 coordinated by a patient flow matron and senior infectious disease clinician. Each ward has a designated single  
34 colour, although some red/yellow wards have designated individual bays as red or yellow. The emergency  
35 department is similarly divided to allow patients in the white category minimum exposure to COVID-19 suspects.  
36 All outpatient clinics are regarded as white areas. The hospital has seen a large reduction in white area admissions,  
37 has proactively cancelled elective surgery and reduced clinic attendances as well as conducting out-patient  
38 consultations by phone/virtual technology.  
39

### 40 **Delivery of routine essential services**

41 Beyond the hospital setting, there has been re-orientation of essential service delivery, with rapid re-structuring of  
42 primary health care services and a shift at hospital and primary care levels towards the use of telemedicine and  
43 phone consultations. Cancer care, which often involves both immunosuppressive therapy, tumour resection and  
44 inpatient treatment has been disproportionately affected throughout the pandemic (17). Necessary adaptations  
45 to service delivery have been made, in order to minimise potential risk of COVID-19 infection, including changes to  
46 mode of chemotherapy treatment and use of short-course radiotherapy treatment. For some patient's surgery  
47 may be delayed or cancelled (ibid). Many of these modifications may not ultimately affect long-term outcomes.  
48 There is the need however, to track and monitor outcomes for these patients, to learn lessons from modifications  
49 to usual recommended guidelines in response to COVID-19 adaptations.  
50

51 Patients with ongoing care needs, include pregnant women needing maternal health care; patients with chronic  
52 disease and patients needing chronic cancer care. These patients often need frequent follow-up, including  
53 laboratory investigation and availability of blood transfusion services and also experience increased risk of severe  
54 illness and death from COVID-19 infection (18). Given the justifiably rapid nature of COVID-19 adaptations, there  
55 is the risk that vulnerable patients may become lost to the health system or that quality of care may be  
56 compromised in consequence. At this stage it is important to review these decisions, who was involved in these  
57 processes, along with their acceptability to health workers and populations, in order to identify and respond to any  
58 weaknesses.  
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## Lessons from past epidemics

Countries in West Africa have recent experience of responding to the Ebola epidemic, with valuable lessons for the UK and beyond in the current COVID-19 pandemic. One lesson was the differing values placed on elements of resilience held by global and national actors, compared with health workers and community leaders. Few of the emergency interventions introduced in response to the Ebola epidemic were designed to promote resilience beyond the immediate crisis (19). While there is an awareness among those planning the COVID-19 response in Merseyside of the need to plan for recovery while responding to the pandemic, there is need to understand and inform how this is implemented.

Another key lesson from the Ebola epidemic relates to the need for the continuation of essential services and to maintain patient confidence in the health system to safely deliver essential services and to control infection risk within the facility (1). During the Ebola epidemic in West Africa substantial reductions in availability and use of critical essential health services were reported, leading to over 80% reductions in maternal delivery care in Ebola - affected areas (20). Analysis suggests that deaths attributable to health systems failures exceeded deaths from Ebola (1). Rapid health systems assessment in Liberia (with possible expansion to other West African settings during phases two and three), will be used to produce guidance for healthcare implementers about good practices.

Our study has been informed by health workers, delivering care within Merseyside for COVID-19 patients and by health decision-makers in Liberia involved with the Ebola response and COVID-19 preparedness planning. This study will seek to identify adaptations to routine essential service delivery introduced in response to COVID-19 pandemic; along with ways to evaluate the impact of these adaptations on routine clinical services in the short and longer term. Innovations and recommendations for improvement by those delivering these services will be identified during phase one, with phases two and three seeking to set up appropriate identified data collection avenues to measure impact of these modifications. This study will endeavour to identify the strengths of these adaptations, which add to the delivery of patient-centred care and should be carried over as the health system transitions beyond the immediate COVID-19 response.

## Study phases

This study is anticipated to involve three phases, these will be described in more detail through the protocol (see figure 2 and 3). At this stage REC approval is being sought for Phase one only, in order to facilitate the timely collation and analysis of findings to inform COVID-19 response as it is ongoing.

Approval for phases two and three is not being sought through this REC application, since these phases will be heavily informed by findings generated from phase one. A further amendment will be submitted to the REC prior to commencing these phases. Phases two and three are described here to provide a clearer overview and understanding for phase one within the larger study.

## Selection of study sites

### Phase one

Merseyside, UK and Liberia were selected for phase one due to established connections (including members of the research team) working within both these regions as part of COVID-19 response efforts. As a result, this research protocol has been informed by health workers directly involved with the COVID-19 response within both contexts. Longstanding research collaboration exists between researchers in LSTM and MOH Liberia. These connections facilitate the research team's ability to start this study, informing practice as soon as possible. In both Merseyside and Liberia, there have been calls for this research to inform and learn from adaptations to essential services introduced as part of the COVID-19 response.

Merseyside, UK is an urban region in the North West of England, with a population of 1.42 million. To date, the North West region of England, which includes Merseyside, has experienced the second highest number of COVID-19 related deaths in the UK outside London (21). The health of people in Liverpool is generally worse than average in England and it is among 20% of the most deprived council areas in England (22). Liverpool City has prioritised tackling deprivation and reducing health inequalities (23). This includes a focus on person-centred care, with integration of health and social care services (ibid). Merseyside region has also established a Resilience Forum, which is a multi-agency partnership of organisations needed to prepare for and respond to any emergency (24).

Liberia, in West Africa, has a population of 4.8 million (25). Ten years after the conclusion of two civil wars, Liberia was severely affected by the 2014-2015 Ebola epidemic, with more than 10500 cases reported and nearly 5000 deaths (19). This prior epidemic response experience brings considerable lessons of value during the current pandemic response, with Liberia having introduced much more stringent border control measures at a much earlier stage of the current pandemic, in comparison to UK.

Within Merseyside, UK the focus of discussions during phase one about decisions will be at the regional through to health facility level. While in Liberia, the focus of these discussions during phase one will be at national level. The study will be carried out at different levels, due to stakeholders at these levels in each context, having expressed demand and need for this research and thereby, the opportunity to carry out this research and for it to potentially inform COVID-19 response.

While the responses to the COVID-19 pandemic within each context differ considerably, according to the pre-existing health system and external capacities, the level at which the study will be carried out – national in Liberia, compared with regional in Merseyside, there is still learning from past crises which reveals generic factors which can help or hinder the responsiveness of a health system (5).

Possible areas of commonality between contexts include:

1. Evaluations of innovations to routine essential health service delivery: The COVID-19 response has required that service delivery is re-oriented, this has provided the need for innovations which push the boundaries of usual standards of care, yet which may carry greater overall benefit for patients, examples identified by clinicians in Merseyside include: oral chemotherapy; short course of radiotherapy; telephone clinics; starting treatment remotely based on a photo; early discharge; conservative management for things that might have been operated before; dispensing six months (rather than three months) of treatment for HIV or other conditions that are stable. While the innovations will differ between contexts, the need for systematic evaluation of the impact, through identification and monitoring of indicators for success of these innovations is common. In order to provide clarity surrounding whether (or not) these innovations should be continued beyond the COVID-19 response period, with awareness of the need for multiple iterations to develop the optimal restructuring of service delivery.
2. Understanding the human resource management changes and implications associated with the COVID-19 response, with health workers being asked to up-skill to work outside of their usual role; troubling issues faced by health workers; and opportunities for improved human resource management, with a flatter hierarchy and better communication among team members, with greater ability to call out bad practice.
3. Learning lessons about embedding improved practices, introduced and reinforced through the COVID-19 response, such as improved cleanliness and hygiene within healthcare settings. Exploring lessons surrounding how to maintain these practices beyond the COVID-19 response.

### **Phases two and three**

During phase two and three a selection of up to two counties in Liberia will be selected for further discussions about sub-national decision-making. These counties will be identified in consultation with national decision-makers and an effort to include one urban and one rural county will be made, to bring differing perspectives.

In addition, depending on findings from phase one and expression of interest in the research study in other settings, there is the possibility that an additional region within UK and/ or another country may be added during phases two and three. This will be fully described in an additional amendment prior to starting phase two.

### **Aim**

To assess the impact of adaptation of health systems as a result of COVID-19 in Merseyside, UK and Liberia and produce guidance for essential service delivery during the crisis and to promote stronger health systems in the immediate recovery phase and beyond.

### **Objectives**

This study will work towards achieving three main objectives:



**Objective 1**

To evaluate and support decision-making processes for essential service delivery, including communication and implications of these for the health workforce during periods of health systems adaptation.

**Objective 2**

To understand the impact of COVID-19 adaptations on equity and quality of routine health care delivery, including laboratory and blood transfusion services.

**Objective 3**

To document cross-context learnings and innovations (Merseyside, UK and Liberia) of necessary health systems adaptation to maintain essential service delivery and to develop recommendations of best practices during times of crisis.

**Research Question**

What opportunities are there to support decision-making; to strengthen essential service delivery through health systems adaptations brought about in response to COVID-18 pandemic in the recovery period and beyond?

**Study Design and Phases**

A three-phase study will seek to respond to the three study objectives using an iterative and layered approach (see figures 2 and 3). This protocol provides an overview of the study methodology for all phases of the study. However, details for the methods, ethical considerations, tools and participant information sheets are detailed for phase one of the study only, since subsequent phases will be informed by findings from phase one. An amendment to this ethics application, including these details, will be submitted at a later date.

Figure 2 Study Timeline

Year	2020								2021								2022							
Month	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Phase 1	█	█	█																					
Phase 2				█	█	█	█	█	█	█	█	█												
Phase 3													█	█	█	█	█	█	█	█	█	█	█	█

**Phase one**

Phase one seeks to provide preliminary findings and early guidance with the aim of informing and strengthening resilience within the health system during the COVID19 response (see figure 3). Since the objectives have a wide-ranging scope, potentially encompassing the whole health system, phase one will maintain a relatively ‘broad brush’ approach. Through this approach we intend to identify tracer conditions, health systems levels, focal areas and participants to study in greater depth during phases two and three.

Methodology for phase one will include a combination of primary and secondary data. Secondary data will involve international literature review and review of key documents in UK and Liberia (see below).

Primary data collection for phase one will focus around key informant interviews with a wide range of health care workers and decision-makers in Merseyside, UK and with informants from the preventive services section of the MOH Liberia.

Questioning within interviews will explore key areas of health systems functioning including: governance and decision making; which ethical guidelines are used, and how and if these ethical guidelines are operationalised at the frontline; human resource management and health care worker support; how innovations are started and evaluated for impact; and perceptions of the equity and quality of service delivery.

Table 1 Key research questions and methods for each study objective

Objective	Research Questions	Methods
1. To evaluate and support communication of decision-making processes for essential service delivery and implications of these for the health workforce during periods of health systems adaptation.	<p>What is the nature of decisions being made by health workers, particularly those providing routine essential care?</p> <p>What informs these decisions?</p> <p>What is the nature of decisions being made by regional/ national health decision-makers?</p> <p>How are they communicated?</p> <p>What added support do health workers and decision-makers want to guide these decisions?</p> <p>What are the lessons learned from EVD that are being taken forward to the Liberian COVID-19 response planning? What is similar, what is different?</p>	<p>Key informant interviews</p> <p>Document and literature review</p>
2. To understand the impact of COVID-19 adaptations on equity of essential health care delivery, including laboratory and blood transfusion services.	<p>What has worked well?</p> <p>What is the extent of adaptations to routine essential service delivery?</p> <p>How have these adaptations affected patient care?</p> <p>Whose needs are met/unmet? Why?</p> <p>What changes are needed to COVID-19 adaptations to improve use of services according to need?</p>	<p>Key informant interviews</p> <p>Document and literature review</p>
3. To document cross-context learnings and innovations (Merseyside, UK and Liberia) of necessary health systems adaptations to maintain essential service delivery and to develop recommendations of best practices during times of crisis.	<p>What are the key lessons learned about health systems adaptation in response to a disease outbreak?</p> <p>How are decision makers in Liberia planning to address these through their COVID-19 response?</p>	<p>Key informant interviews</p> <p>Document and literature review</p>

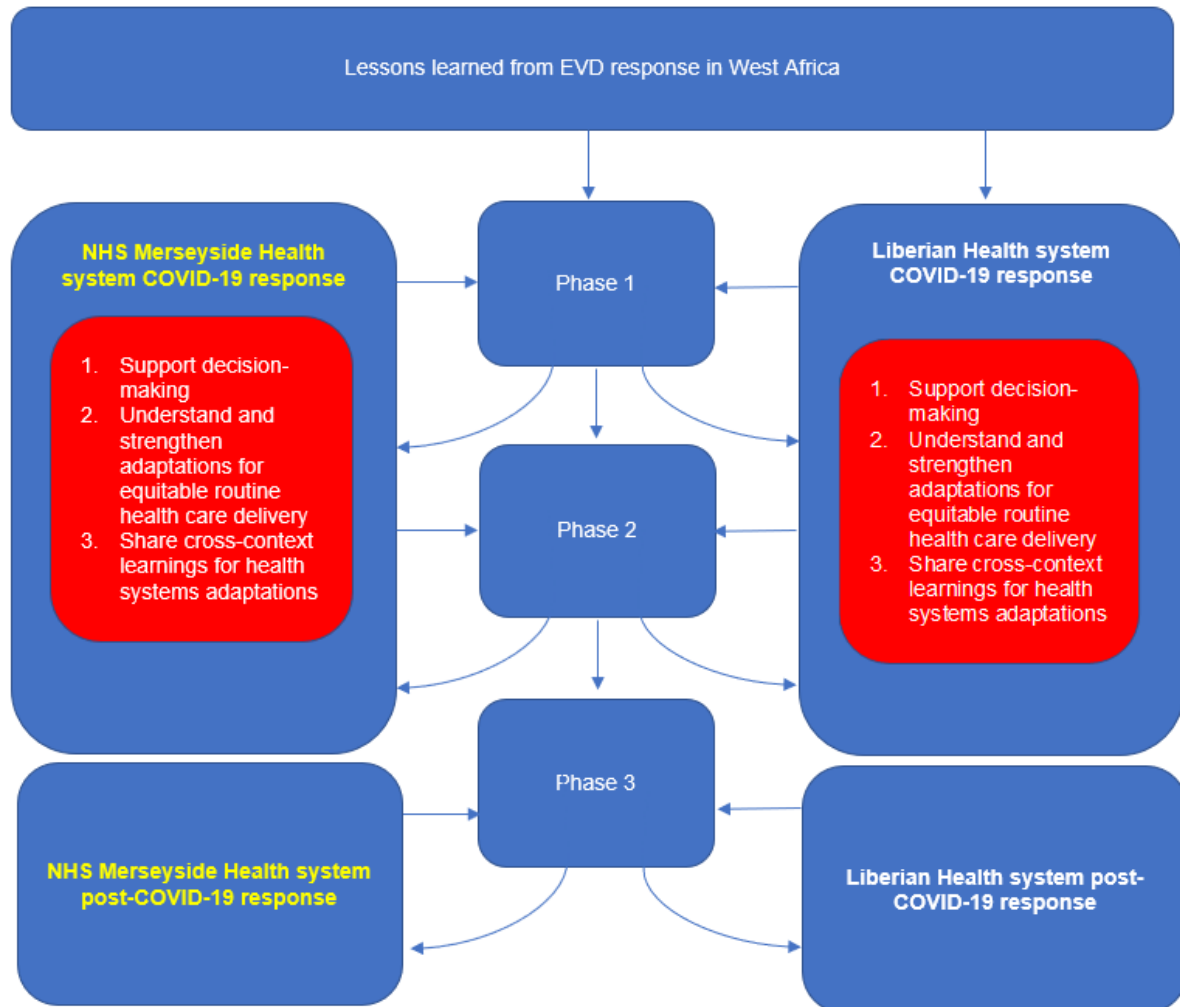
Phase two: Phase two will provide a more in-depth study to gain greater depth of understanding of focal areas within the objectives, through in-depth interviews with a targeted, smaller range of interviewees including patients with chronic care and/ or ongoing care needs (e.g. maternal health care/ chronic disease/ chronic cancer care). Phase two may also involve more focus on a particular health system level, e.g. primary health care level or secondary care level, depending on findings from phase one, which includes a broad range of participants across health systems levels. It is hoped that phase two will also involve the tracking of indicators to measure the impact of selected adaptations, identified through phase one.

Other forms of data collection (such as use of existing health systems data; health worker audio diaries; observations and document analyses) may be employed for data collection during phase two, depending on findings from phase one.

Phase three: The third and final phase is an optional phase, subject to securing additional funding, which will seek to provide and consolidate lessons learned through the COVID-19 response to utilise the 'window of opportunity' in the period immediately following the COVID-19 pandemic response to strengthen universal health coverage,

either through successes of the COVID-19 adaptations studied through phases one and two; or to propose recommendations for change based on weaknesses or challenges associated with these adaptations.

Figure 3 Study overview



### Overview of methods for phase one

#### Literature review

A rapid appraisal of the literature will be carried out to review the literature published regarding lessons for epidemic and pandemic response and the provision of services throughout a response. It is anticipated that much of this literature will originate from the West African Ebola epidemic.

Due to the need for rapidity within the process, peer reviewed literature will be reviewed, with addition of grey literature as time allows. We will develop a search strategy including search terms, search methods and possible databases. Findings from the literature review will be used to guide the formation of a thematic framework for the study. Literature review findings will be summarised into a brief report.

#### Key documents review

A rapid review of guidance documents available to frontline workers and decision-makers to assist them in their care for patients and in the re-orientation and adaptation of health service will be carried out. This will focus primarily on WHO, MOH Liberia UK government and NHS guidance (1,26). Key documents will be identified



1  
2  
3 through online searches; COVID-19 health worker training sites (27), through key informant interviews and by  
4 contacting relevant individuals via phone, skype or email. Once documents are obtained, these will inform the  
5 development of a thematic framework.  
6

### 7 **Key Informant Interviews**

8 Within Merseyside primary data collection will focus around 30-55 key informant interviews with a wide range  
9 of health care workers involved directly in the COVID-19 health systems adaptations within the UK NHS and  
10 those working in other key areas of the health system, for example senior health officials involved with decision  
11 making, laboratory personnel, and health staff working on ensuring the continued provision of essential health  
12 services, including maternal health care, chronic cancer care and chronic disease management. Within  
13 Merseyside key informants will include – regional decision-makers; NHS managers; outpatient clinic staff; IT  
14 service staff supporting telemedicine clinics; health workers providing essential health services and laboratory  
15 and blood transfusion workers, due to the recent massive push to increase capacity for testing for COVID-19.  
16

17 In Liberia, key informants will include 15-20 informants from the preventive services section of the MOH Liberia.  
18 These informants will include national level directors for key service delivery programs, such as health  
19 promotion, family health, NCD program, community health and laboratory and transfusion services, who played  
20 key roles in the Ebola epidemic response and who are involved with COVID-19 response planning.  
21

22 The research team includes researchers who currently work within the UK and Liberia as health workers; NHS  
23 laboratory personnel and as members of the public health commission in the UK, in addition to their role as  
24 researchers. Liberian colleagues who played instrumental roles in the Ebola response during 2014-2015, and  
25 who are presently involved with guiding decision-making for Liberia's COVID-19 response, have been involved  
26 with discussions as part of the development of this research protocol.  
27

28 During phase one, the researchers' existing knowledge of the health system, key individuals leading the response  
29 and suitable participants in UK and in Liberia will be used to identify potential participants. Where gaps in  
30 understanding persist, a snowball approach will be adopted to identify other participants with key  
31 understanding of the study objectives.  
32

33 Participants will initially be contacted by a member of the research team, where the participant is already known  
34 to one of the researchers to introduce the study and to request their participation in the study. Where the  
35 participant is not known to the researcher, but is identified through a snowball approach, the known contact of  
36 the participant will be requested to seek permission from the participant for their contact details to be shared  
37 with the research team.  
38

39 If the participant is agreeable to participate, and with their permission, their contact details will then be shared  
40 with a member of the research team, who will contact the participant by phone and or email to establish a time  
41 suitable to the participant for the interview.  
42

43 Participants will be provided with the participant information about the study via email at least 24 hours before  
44 the scheduled time for the phone interview, to allow time for the participant to review the consent form and  
45 learn more about recording of the interview (28), please see research toolkit for sample participant information  
46 sheets.  
47

48 Due to physical distancing, interviews will be carried out via phone or skype. As part of the introduction to the  
49 research, the researcher will request permission from the interviewee to audio record the consent process (ibid)  
50 as well as the content of the interview (see research toolkit for initial participant introduction, including  
51 permission to record consent). Should skype be used the participant will be given to use the video option or  
52 not, depending on which they feel most comfortable with (ibid). Participants will also be offered the opportunity  
53 to respond via email if they prefer.  
54

55 The consent process will provide an overview of the study, why the participant has been invited to take part,  
56 the voluntary nature of participation, option to refuse to participate at any point with no negative consequences,  
57 what participation will involve including anticipated length of interview, reimbursement, possible disadvantages  
58 and benefits from participation, option to withdraw at any point, confidentiality and data management  
59 overview, how the research will be used, data protection and who to contact for further questions.  
60

1  
2  
3  
4 Data from phase one will be used to identify suitable participants for phase two of the study. It is currently  
5 unknown exactly who will participate in phase two of the study, although it is likely that both health workers  
6 and patients will take part. Details for recruitment and informed consent of phase two participants will be  
7 shared in a study amendment, following preliminary analysis of phase one data.

8  
9 Participants will be encouraged to share any suggestions or recommendations they have for making  
10 improvements to the COVID-19 response and to improve health services in the immediate recovery period and  
11 beyond.

12 Table 2 Phase one study participants – removed for anonymity  
13  
14

### 15 **Anticipated Study Methods for Phase Two**

16  
17 Findings from phase one may lead to modification or revision of the study objectives in response to the identified  
18 weaknesses or the recognised strengths and innovations of the COVID19 adaptations employed to date.  
19

20 Phase two will provide a more in-depth study to gain greater depth of understanding of focal areas within the  
21 objectives, through in-depth interviews with a targeted, smaller range of interviewees including patients with  
22 chronic and/or ongoing care needs (e.g. maternal health care). Since it will not be feasible to explore the effect  
23 of COVID-19-related ethics and adaptations on every clinical discipline, we will study in more depth the chronic/  
24 ongoing 'tracer' conditions identified through phase one that reflect different aspects of the health system  
25 (these may vary across contexts). Tracer conditions may include maternal health, since it cannot be delayed, it  
26 has a pre-set schedule, and learning from other health systems shocks such as Ebola show us that maternal  
27 mortality can be negatively impacted during these periods. Breast cancer care may be another possible tracer  
28 condition, since it is an excellent marker of a well-functioning health system testing screening, referral and rapid  
29 access clinic. There is clinical data available, which could be used as indicators to monitor this. Other tracer  
30 conditions will be identified through phase one. Once health systems adaptations and related tracer conditions  
31 have been identified options to evaluate the impact of these adaptations on the tracer condition will be  
32 explored. This may involve use of existing health data.  
33

34 In addition, other forms of data collection (such as health worker audio diaries, observations and document  
35 analyses) may be employed for data collection during phase two, depending on findings from phase one.

36 Health worker audio diaries/ review of social media may be employed to gain a more detailed understanding of  
37 the everyday practices and reflections of health workers involved with COVID-19 response and in the provision of  
38 essential health services. If this method is used health workers will be asked to participate in diary keeping by a  
39 record through written and/or videos or voice memos about their everyday practices. The researchers role can be  
40 to provide participants with questions or prompts to direct their recordings and documentation (29). These  
41 methods may be combined with traditional in-depth interviews to follow up on findings from the diary/ video  
42 elicitation methods.  
43

44 Observation may also be employed as a method. Given the need for physical distancing, this may be  
45 incorporated within the health worker diaries, with health workers trained on the use of a structured tool to  
46 reflect on their observations about their work over a certain period as part of diary keeping.  
47

### 48 **Anticipated Study Methods for Phase Three**

49 The third and final phase is an optional phase, subject to securing additional funding, which will seek to provide  
50 and consolidate lessons learned through the COVID-19 response to utilise the 'window of opportunity' in the period  
51 immediately following the COVID-19 pandemic response to strengthen universal health coverage, either through  
52 successes of the COVID-19 adaptations studied through phases one and two; or to propose recommendations for  
53 change based on weaknesses or challenges associated with these adaptations.  
54

### 55 **Data Analysis for Phase One**

56  
57 Due to the need for rapid data collection and analysis, with recommendations and guidance issued as the COVID-  
58 19 response is ongoing, along with many of the researchers involved carrying out this work in addition to their usual  
59 workload, data analysis will be led by a smaller group of researchers (see research analysis team above), with the  
60

broader team involved throughout. The whole research team will be invited to review and provide comments and suggestions throughout the data analysis process.

### **Literature and document review**

Initial findings from the literature and document reviews will be used to develop a thematic framework, which speaks to the research objectives. This framework will then be used to guide the full data collation and analysis from the literature and document reviews.

### **Qualitative data**

Interviews with decision-makers in Liberia will identify how they intend to use lessons from the EVD response while implementing their COVID-19 response. This will be triangulated with findings from interviews with health workers in Merseyside surrounding 1) Decision-making for COVID-19 and 2) Equity and quality of essential service provision amidst COVID-19 adaptations of the health system.

Interviews will be audio-recorded, notes will be taken during and immediately following the interview. During phase one, full transcription will not be carried out, in order to ensure timeliness of analysis and rapid development and issuance of guidance to inform the COVID-19 response. Rather, several researchers will quality check that notes taken accurately capture the content and main discussion points of the interview. Interview notes will then be analysed thematically using a framework approach, as described below (30). Several researchers will initially take the lead with the analysis of the data, while all researchers will have opportunity to review, comment and provide suggestions as part of the analytical process. Data will be shared between researchers using a password protected file within dropbox business, or alternatively through the next cloud platform (hosted by LSTM). Audio recordings will be deleted after checking following transcription/ extensive note taking, in order to preserve anonymity. Data will be stored for seven years. Consent forms and/or participant names will be kept separately from other files in order to protect anonymity.

### **Stage 1: Data Management**

Step 1: Familiarisation - the analysis team will read and re-read the notes to 'familiarise' themselves with the data. Whilst doing this they take note of key themes emerging.

Step 2: Iterative revision of thematic/coding framework initially developed through literature review - a framework through which to sort the data will be developed based on original aims and objectives and any inductive themes identified during the familiarisation process.

Step 3: Indexing/coding data - the thematic/coding framework will be applied to all the data. This will be assisted by the use of NVIVO software.

### **Stage 2: Data Explanation**

Step 4: Charting - data will be lifted from its original context based on its allocation to the coding/thematic framework and placed within a chart.

Step 5: Mapping - the final stage of the process will be to interpret, and map the range of polarities and similarities within the data.

Qualitative analysis software NVIVO 12 PRO will be used to support data management and analysis.

### **Outcomes**

Through this study we hope to contribute towards the following outcomes:

Outcome 1: Pragmatic guidance and support for decision-makers and health workers making decisions about communication of decisions and the implications for the health workforce.

Outcome 2: Evidence about the felt impact of COVID-19 health system adaptations by health workers delivering these and recommendations to promote equity and quality within these.

Outcome 3 (phase 2): Evidence about patient perceptions of equity and quality of services, following adaptations in response to COVID-19 and recommendations to promote equity and quality within these.

1  
2  
3 Outcome 4 (phase 2 and 3): Resource documents guiding how to prioritise equity and quality and sustain  
4 resilience into the immediate recovery phase.  
5

6 Outcome 5 (phase 2 and 3): Tracer condition and indicators identified to assess impact assess health systems  
7 adaptation identified.  
8

9 Outcome 6: Recommendations for health systems adaptations which support universal health coverage  
10 throughout times of crisis.  
11

## 12 **Dissemination**

13 Since phase one is a rapid appraisal during which we plan to identify rapid lessons to inform and strengthen the  
14 COVID-19 response while it is ongoing, there will necessarily be an early preliminary dissemination of research  
15 findings. The details of this have not yet been finalised. This may take the form of recorded teaching session made  
16 available on various platforms, such as LSTM website, global health network; a learning brief or other form of  
17 dissemination and will be informed by phase one findings, where participants are asked to identify the type of  
18 additional support which is needed. It is intended that the findings will be shared both with the study participants  
19 and also made available for all relevant colleagues, e.g. health workers involved with decision-making.  
20 Dissemination of findings will be tailored if necessary, according to the context Merseyside vs Liberia and to the  
21 audience, e.g. doctors, nurses vs laboratory personnel.  
22

23 Following phase two and three of the research study findings will again be shared with study participants and their  
24 colleagues, according to their role.  
25

## 26 **Ethical approvals**

27 Sponsorship and REC approval will be sought from LSTM, REC approval from University of Liverpool, Confirmation  
28 of Capacity from Research, Development and Innovation at Royal Liverpool Hospital (via SPARK).  
29

## 30 **Potential risks, adverse effects, discomfort or risks and how these will be mitigated**

31 Since this study will involve interviews with frontline health workers, who are already expected to attend many  
32 additional meetings, there is the potential risk that the study will add to their workload. To mitigate this, every  
33 effort will be made by the researchers to accommodate the health worker's timeframe, with interviews scheduled  
34 according to the health workers availability. Questions will be reviewed and prioritised to ensure that interviews  
35 with frontline health workers are kept as short as possible, preferably less than 45 minutes per interview.  
36 Researchers will be open with participants about the timeframe needed for the interview. Additionally, it will be  
37 made clear to participants that they do not have to take part if they do not wish to do so and that non-participation  
38 will not bring any negative consequences. Interviews will be carried out online/ by phone which may limit the  
39 opportunity for reassurance involved during face-to-face interviews.  
40

41 Remembering and describing particular patient stories, or issues around PPE as part of the discussion about ethics  
42 and the dilemmas involved with decision-making, may be traumatic for some health workers. Some participants  
43 may describe burn out and mental health issues. All interviewers involved with carrying out interviews are trained  
44 and experienced qualitative researchers. The interviewee will be advised as part of the consent process that he/she  
45 can pause or end the interview at any stage. In addition, the interviewer will refer the participant to the NHS mental  
46 health hotline for staff tackling COVID-19 if felt to be needed. In Liberia, Links will be made to relevant support  
47 services, including the MOH Mental Health team and the Carter Center, if needed.  
48

49 Participants may disclose ethical issues surrounding unsafe practices. If unsafe practices are disclosed which  
50 identify that patients are being put at risk then this would be reported to the study principal investigator, NHS  
51 research and development forum, and the ethics board for further action in the UK. In Liberia, this would be  
52 reported to the relevant MOH Liberia actor. Participants will be advised of this as part of the consent process.  
53

54 In light of recent 'gagging' of health workers regarding speaking out about lack of PPE, some health workers may  
55 fear repercussions for highlighting challenges experienced. As part of the consent process participants will be  
56 advised of the importance of confidentiality. Unless the participant gives additional specific consent to be identified  
57 (see consent form in Area D\_Toolkit), all data collected within interviews will be anonymized in reports and  
58 publications.  
59  
60

Potential risk of transmission of COVID-19 during the interview. Interviews will be carried out via phone/skype in order to reduce risk of transmission of COVID-19.

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# BMJ Open

## Qualitative study exploring lessons from Liberia and the UK for building a people-centred resilient health systems response to COVID-19

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1 **Title Qualitative study exploring lessons from Liberia and the UK for building a people-centred**  
2 **resilient health systems response to COVID-19**

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## 12 **Abstract**

13 Introduction: COVID-19 has tested the resilience of health systems globally and exposed existing  
14 strengths and weaknesses. This study uses the concept of people-centred health systems to explore  
15 the applicability of the Foreign, Commonwealth and Development Office (FCDO) principles for health  
16 systems' resilience in two contrasting contexts – Liberia and UK.

17 Methods: We carried out qualitative interviews with 24 health decision-makers at National and County  
18 Level in Liberia and 42 actors at County and hospital level in the UK (Merseyside). We explored health  
19 systems' decision-making processes and capacity to adapt and continue essential service delivery in  
20 response to COVID-19 in both contexts.

21 Results: Study respondents in Liberia and Merseyside had similar experiences in responding to COVID-  
22 19, despite significant differences in health systems context, and there is an opportunity for multi-  
23 directional learning between the global south and north. The need for early preparedness; strong  
24 community engagement; clear communication within the health system, and health service delivery  
25 adaptations for essential health services emerged strongly in both settings. We found the FCDO  
26 principles to have value as a framework for reviewing health systems changes, across settings in  
27 response to a shock such as a pandemic. In addition to the eight original principles, we identify two  
28 additional principles; 1) the need for functional structures and mechanisms for preparation and 2)  
29 adaptable governance and leadership structures to facilitate timely decision-making and response  
30 coordination. We find the use of a people-centred approach also has value to prompt policy makers  
31 to consider the acceptance of service adaptations by, patients and health workers, and to continue  
32 the provision of 'routine services' for individuals during health systems shocks.

33 Conclusion: Our study highlights the importance of a people-centred approach, placing the person at  
34 the centre of the health system, and value in applying and adapting the FCDO principles across diverse  
35 settings.

## 36 **Strengths and Limitations of the Study**

- 37 • A key strength of this study is the multi-directional learning between health systems in the global  
38 south and global north, which involved a wide range of researchers across both settings, and the  
39 breadth of perspectives captured from frontline staff and key decision-makers.
- 40 • We find that the FCDO principles can be usefully applied across diverse contexts, with  
41 identification of two additional new principles, related to mechanisms for advanced preparedness  
42 and adaptable governance and leadership structures.
- 43 • The greatest limitation of this study is that it was carried out at a single point in time, towards the  
44 end of the first wave in the UK and before there had been a large increase in cases in Liberia.  
45 Response measures have evolved in both settings in subsequent stages of the pandemic.
- 46 • The study was limited by the differing range of respondents across study settings, with  
47 participants from across a range of health system levels including primary care, hospital frontline  
48 workers and decision-makers as well as regional decision-makers within Merseyside, UK;  
49 compared with national and county level decision-makers, technicians and supervisors of frontline  
50 staff in Liberia, which may result in differing perspectives.

51

## 52 Introduction

53 The COVID-19 pandemic has forever altered our world. Its impact has been felt across all nations,  
54 demonstrating the importance of resilient health systems in protecting global health security.[1]

55 Health systems have been forced to adapt to new ways of working alongside the continued provision  
56 of essential services including: prevention of communicable diseases; sexual and reproductive health;  
57 care for vulnerable populations; ongoing management of chronic illness (including mental health  
58 conditions); continuity of critical inpatient therapies; management of emergency health conditions;  
59 and auxiliary services, including diagnostic imaging, laboratory and transfusion services.[2]

60 In April 2020, the United Nations expressed concern that, within Africa, up to 3.3 million people could  
61 lose their lives as a direct result of COVID-19 and many more through the indirect effects of disruption  
62 to health services and worsening socioeconomic conditions.[3] Conditions considered to increase the  
63 risk of infection include overcrowded and poorly serviced slum dwellings; limited access to basic  
64 handwashing facilities; high levels of informal employment limiting ability to work from home; high  
65 levels of malnutrition and lower ratios of beds and health workers to the population.[3] A commentary  
66 published by Agyeman et al. (2020) at the outset of the pandemic highlighted a rapid response within  
67 many African settings, including focus on early introduction of screening procedures at ports of entry,  
68 need for effective community engagement to educate about the mode of transmission. Key protective  
69 behaviours were emphasised, along with the need to prepare intensive care beds and clear government  
70 strategies regarding how to deal with hospitalised COVID-19 patients to avoid disrupting the health  
71 system and to prevent non-COVID-19 related deaths.[4] Subsequent studies have revealed that indirect  
72 health impacts from COVID-19 disproportionately impact women and children.[5,6] Diversion of  
73 resources (financial, material, human) from existing health services to address the pandemic, impacts  
74 their care.[5,6] This includes supply and demand side disruptions that can result in lower utilization  
75 of health care and, in some cases, impact on quality of care.[7] Bayani et al (2021) surmise that “less

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3 76 health care will result in more ill health and deaths because health services have been suspended,  
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5 77 displaced, or inaccessible.”(page 5 [7])  
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8 78 Our study was carried out immediately following the first wave of COVID-19 in Liberia and UK (interviews  
9  
10 79 carried out June to September 2020) in response to an expressed need by stakeholders for this research  
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12 80 following dialogue in both contexts. The study was conducted within these two contexts (Merseyside  
13  
14 81 region and Liberia) based on strong prior research relationships within both settings. The differing  
15  
16 82 perspectives from national and county respondents speaking on the national response in Liberia, and  
17  
18 83 frontline health workers and decision makers up to regional level in Merseyside based on their personal  
19  
20 84 experiences and more localised regional response is a key limitation. We chose these settings due to  
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22 85 the opportunity and demand for research, not because they are exemplars of COVID-19 response. There  
23  
24 86 is, however, still opportunity for learning and comparison on both the strengths and weaknesses within  
25  
26 87 the COVID-19 initial response in both settings. The pandemic has continued to evolve across both  
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28 88 settings, with both Liberia and UK experiencing much larger waves of COVID-19 since this original study  
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30 89 was carried out. These findings from the first wave can provide valuable lessons to inform continued  
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32 90 response to COVID-19 and other health systems shocks.  
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38 91 The pandemic has revealed monopolies of knowledge production, which disempower lower and middle-  
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40 92 income countries;[8] whilst pandemic responses in ‘developed democracies’ have been inadequate,  
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42 93 with cuts to health and social services and limited commitment to equity or governance.[8] So-called  
43  
44 94 “global powerhouses with tried and tested health systems have struggled to contain the COVID-19  
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46 95 pandemic”[9] and health systems have been stretched to the limit, resulting in negative implications for  
47  
48 96 the health of all populations, particularly when access for patients with other acute and chronic illness  
49  
50 97 is limited.[8] As of 01/09/21, UK (population 66.8 million)[10] has 6,821,356 confirmed cases and  
51  
52 98 132,859 COVID-19 related deaths.[11] In the UK, the National Health Service delivers care for most of  
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54 99 the population. Meanwhile during the same time period, Liberia (population 4.9 million)[10] has had  
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56 100 5594 confirmed cases, with 245 confirmed COVID-19 related deaths.[11] There are marked differences  
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3 101 between settings in the roll-out and scope of testing capacity and uptake of this, with under-reporting  
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5 102 in many lower middle income countries, and so these figures cannot be assumed to be accurate. Future  
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7 103 comparisons will eventually show the magnitude of all-cause mortality by age, and firm conclusions  
8  
9 104 can be made about the success of different country approaches. Liberia was, initially hailed as one of  
10  
11 105 the top countries in fighting COVID-19, being one of the first countries to start screening at ports of entry  
12  
13 106 (January 2020) and to adopt other control measures such as rapid testing, contact tracing and  
14  
15 107 quarantine.[12,13]  
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18  
19 108 “Improving resilience within health systems can build on pre-existing strengths to enhance the  
20  
21 109 readiness of health system actors to respond to crises, while also maintaining core functions.”(page 1  
22  
23 110 [1]). People-centred health systems are a critical framing in shaping resilience as they place people  
24  
25 111 and communities at the centre whilst also promoting strategic and collaborative multi-sectoral  
26  
27 112 leadership which is necessary in delivering a co-ordinated response to a public health crisis.[14] In this  
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29 113 paper, we compare health systems responses at a single point in time (June to September 2020) within  
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31 114 Monrovia, Liberia and Merseyside, UK to distil lessons for health systems resilience to a pandemic  
32  
33 115 through comparative case studies which explore aspects of health systems resilience.[15] Within this  
34  
35 116 paper we combine the Foreign, Commonwealth and Development Office (FCDO) eight key principles  
36  
37 117 for promoting resilient health systems with key domains and values of people-centred health systems  
38  
39 118 to frame our findings in relation to the COVID-19 response.[16] Through our discussion we reflect on  
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41 119 these principles against our conceptual framework (figure 1), which is based on a people-centred  
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43 120 approach. In response to calls for on-the-ground analysis of the response to COVID-19 within the Global  
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45 121 South and comparative case studies that use co-creation and coproduction approaches which go beyond  
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47 122 researchers including policy makers, practitioners and the public,[15,17] we seek to share learning from  
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49 123 the response within Liberia and the UK, along with opportunities for multi-directional knowledge  
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51 124 sharing.[17] It is our hope that this paper will help inform health policy makers across global contexts,  
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53 125 for the current pandemic response and as they plan towards more resilient people-centred health  
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55 126 systems to meet future shocks.  
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3 127 **Methods**  
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6 128 Study context  
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9 129 Liberia and UK have had very different strategies and case rates from the outset of the pandemic,  
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11 130 although there were some similarities in the adoption of infection prevention control measures across  
12  
13 131 both contexts. Liberia is amongst the world's poorest in terms of GDP and living conditions. According  
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15 132 to the World Bank 2016 poverty headcount ratio, 44.4% of Liberians live below the international  
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17 133 poverty benchmark of \$1.90 USD per day.[18] The UNDP Human Development Report 2020 ranks  
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19 134 Liberia low at 175 out of 189 countries and territories.[19] Inequities between females and males are  
20  
21 135 remarkable with literacy rates (secondary education) of 18.5% and 40.1% respectively.[19] Liberia has  
22  
23 136 prior experiences of shocks in the form of two civil wars, and the 2014-2015 Ebola Virus Disease (EVD)  
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25 137 epidemic.[20] In response to these experiences, Liberia has prioritised rebuilding a resilient health  
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27 138 system, which acknowledges the critical role communities play in addressing their own health needs  
28  
29 139 through the 'Investment Plan for Building a Resilient Health System in Liberia' and the community health  
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31 140 services policy (2016-2021).[21,22] By contrast, Merseyside is a Metropolitan County in the North West  
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33 141 of England, comprising five boroughs, including the City of Liverpool, including some of the most  
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35 142 deprived council areas in England.[23] It has a population of 1.42 million and has had some of the highest  
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37 143 numbers of COVID-19 cases in the UK.[24] Within Merseyside, the Liverpool City Region Combined  
38  
39 144 Authority has prioritised tackling deprivation and reducing health inequalities through people-centred  
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41 145 care, with integration of health and social care services.[25] Liverpool has a long history of public health  
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43 146 innovation, but also a strong sense of local history, culture and place. Throughout the pandemic  
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45 147 Liverpool has been at the forefront of community-based innovations and public health strategies, e.g.  
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47 148 piloting community open access testing for COVID-19.[26]  
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54 149 Liberia introduced stringent border control measures from January 2020, with the establishment of a  
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56 150 Special Presidential Advisory Committee on Coronavirus (SPACOC) over two months prior to the first  
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58 151 recorded cases in the country.[27],[28] Liberia's response to COVID-19, prioritised a call to maintain  
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3 152 the delivery of routine health services at all levels. Hospitals and clinics continued to provide health  
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5 153 services with health facility workers trained in infection prevention control (IPC) before the first case  
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7 154 was identified in country.[28] Physical distancing measures were introduced and use of face masks  
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9 155 encouraged.[29]

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13 156 Within the UK, health service delivery was restructured as part of the COVID-19 response, with routine  
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15 157 non-urgent elective care suspended and later re-started in April 2020.[30] Adaptations to minimise  
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17 158 potential risk of COVID-19 infection include the use of telemedicine and phone consultations; and  
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19 159 changes to essential services for patients, such as changed treatment plans and delays to surgeries.[31]  
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22 160 Hospital patient pathways were altered to appropriately triage and cohort the care of COVID-19 patients,  
23  
24 161 reducing the risk of transmission to others and allowing essential services to continue. There was also  
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26 162 reduction in routine blood test screening to prioritize COVID-19 PCR testing in response to the UKs  
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28 163 'test and trace' strategy.

#### 30 31 164 Study aim, design and conceptual framework

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34 165 Aim: To understand COVID-19 adaptations and decision-making in Liberia and Merseyside, UK

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37 166 This qualitative study explored inductively the differing experiences, perspectives and  
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39 167 recommendations of participants in order to understand COVID-19 adaptations and decision-making  
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41 168 in Liberia and Merseyside, UK.[32,33] We selected qualitative methods to give “due emphasis to the  
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43 169 meanings, experiences, and views of all the participants”(page 43 [32]) and understand decision-  
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45 170 making and the impact of health systems adaptations as a result of COVID-19.

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49 171 A conceptual framework was jointly developed, following a series of meetings held with researchers  
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51 172 in each setting (7 Liberia-based researchers and 18 UK-based researchers). This framework sought to  
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53 173 consider a people-centred approach towards the health system’s ability to respond to shock, whilst  
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55 174 reflecting the realities experienced in the face of multiple routine challenges (Figure 1).[34] The  
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57 175 nature of a shock to the health system, whether due to infectious disease outbreak, natural disaster,  
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3 176 or conflict, influences the rest of the framework.[35] It adopts a people-centred approach at its  
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5 177 heart,[14,36,37] while incorporating literature relating to the health system's ability to respond to a  
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7 178 sudden shock, and the extent to which it is able to absorb, adapt and transform in response (Figure  
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9 179 1).[35,38–42]

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12 180 People-centred health systems prioritise the collective right to health through integrated and targeted  
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14 181 approaches that favour the needs of the most vulnerable.[14,43] Collective action and social solidarity  
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16 182 are viewed as essential to the art and science of the development of people centred systems that are  
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18 183 organised around people's health care needs and expectations as opposed to diseases, ensuring a  
19  
20 184 continuum of care throughout the life course.[14] This approach embraces the human character of  
21  
22 185 health systems, by viewing individuals, communities and health workers as co-producers of health  
23  
24 186 care, placing people and families at the centre.[44] Systems must adapt to meet a range of challenges  
25  
26 187 to support the development of strategies that seek to improve health care access and encourage  
27  
28 188 universal coverage. This is particularly important as many individuals transition and oscillate between  
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30 189 multiple roles of patient, family and sometimes health care provider within one system.

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33 190 Interview topic guides were informed by the framework and developed across both settings to explore  
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35 191 key areas of health systems functioning in response to COVID-19 (Appendix 1). Questions included:  
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37 192 governance and decision-making; use of ethical guidelines; human resource management,  
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39 193 infrastructure (information technology and communications) and health care worker support;  
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41 194 introduction of innovations; and perceptions of the equity and quality of service delivery. Adaptations  
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43 195 were made according to the health systems context in each country, for example in Liberia, additional  
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45 196 questions were included to explore how learning from the EVD epidemic and other health systems  
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47 197 shocks informed COVID-19 response planning.

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50 198 Figure 1 placed here

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53 199 Study participants and data collection

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3 200 The study was carried out at different levels of the health system across both settings (Table 1). In  
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5 201 Liberia, we conducted key informant interviews in June and July 2020 with 21 national level and three  
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7 202 county level decision-makers (Nimba, Margibi and Montserrado Counties) purposively selected  
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9 203 because of their involvement with COVID-19 planning and/or routine service delivery. Some had also  
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11 204 played key roles in the EVD epidemic response. In Merseyside we conducted 42 key informant  
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13 205 interviews between July to September 2020, with regional, hospital and primary care decision-makers  
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15 206 (general practitioners and residential care home manager) and front-line workers selected because of  
16  
17 207 their involvement with COVID-19 planning and/ or the delivery of COVID-19 or routine services (see  
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19 208 Table 1). More interviews were carried out within the UK across health systems levels, due to demand  
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21 209 for research across multiple levels and the presence of a larger team of researchers. In Liberia, by  
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23 210 contrast the demand for research was focused at national level, and the research team was smaller in  
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25 211 size. The national and county level actors in Liberia, spoke about Liberia's response as a country. In  
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27 212 contrast study participants in Merseyside from across health systems levels, including frontline health  
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29 213 workers, spoke of their own direct experience within a particular hospital or setting, or on behalf of  
30  
31 214 Merseyside City Region. We acknowledge the limitation that including national and county level  
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33 215 actors only within Liberia, creates a somewhat limited perspective. It would have been preferable to  
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35 216 have included a larger number and range of participants from sub-national health systems levels to  
36  
37 217 provide more depth of understanding about the COVID-19 response.  
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44 *Table 1 Study participants' role*

Participant Role	Number of Participants Interviewed
<b>Merseyside, UK</b>	
Regional decision-maker	5
Hospital decision-maker (Clinical director, medical director, ward manager)	4
Hospital consultant	11
Hospital health worker (junior doctors, nurses)	10
Health worker in community (GP, district nurse, residential care home)	7
Liverpool Clinical Laboratory staff	5
<b>Total</b>	<b>42</b>

<b>Liberia participants</b>	
National decision-maker	21
County decision-maker	3
<b>Total</b>	<b>24</b>

219

220 Interviews were predominantly carried out remotely by researchers experienced in qualitative  
 221 interviewing in English language, via online platforms such as Microsoft Teams or Skype. A minority  
 222 were carried out in person with physical distancing measures in place, according to local guidance at  
 223 the time. All interviews were audio-recorded. Data collection stopped when no new themes emerged  
 224 from additional data collected.[45] Interviews lasted approximately 30 to 60 minutes. Audio  
 225 recordings were transcribed verbatim, with quality assurance conducted by a second researcher  
 226 against the recording.

### 227 Data Analysis

228 The study has sought to use a pragmatic approach to research, working through existing networks to  
 229 carry out timely research to support the ongoing COVID-19 response in both settings. Both inductive  
 230 and deductive approaches were blended within data analysis, in keeping with other health systems  
 231 research [46–49]. In both Liberia and UK, preliminary data analysis workshops were held separately  
 232 with the research team members involved with data collection. Prior to the workshops all participants  
 233 reviewed transcripts to familiarise and immerse themselves within the data in order to inductively  
 234 identify emerging themes which arose from within the study findings. Through these separate country  
 235 workshops key themes were identified and used to generate a separate coding framework for each  
 236 setting. All transcripts were imported into NVivo Version 12 qualitative data analysis software for  
 237 coding (QSR International Pty Ltd. Version 12, 2018). Following review of the initial themes which  
 238 emerged inductively from within the data, there was found to be strong alignment with the eight  
 239 FCDO principles. These principles were then deductively applied to assist with mapping the findings  
 240 and enabling comparison between settings. The research team did not simply accept the eight FCDO  
 241 principles, rather the team reviewed them and found that they did not fully cover all the aspects of

242 resilience which emerged from the data. As a result two further principles were identified, relating to  
243 “mechanisms for advance preparation” (Principle 9) and “adaptable governance and leadership  
244 structures” (Principle 10). The two new principles were applied to adequately compare findings  
245 between both settings. The application of the expanded FCDO principles has helped to showcase how  
246 Liberia’s experience with responding to prior shocks and their learned need for early advance  
247 preparedness provided an important element working towards resilience. This study is not funded by  
248 FCDO, nor were FCDO involved in any way as researchers or co-authors within the research team.  
249 Detailed findings and recommendations were developed into two policy briefs in accordance with  
250 these principles and were shared and discussed with relevant stakeholders from both study  
251 settings.[29,50] The relationship of the findings to the original conceptual framework was reviewed  
252 and findings compared between settings during a final on-line workshop, attended by all those  
253 involved with data collection in both settings, with key similarities and differences jointly discussed.

#### 254 Ethics

255 Ethical approval was received from the Liverpool School of Tropical Medicine Research Ethics  
256 Committee (Protocol ID 20-045); the University of Liverpool Ethics Committee (Reference 7811) and  
257 the University of Liberia-Pacific Institute for Research and Evaluation Institutional Review Board;  
258 National Health Service Health Research Authority and Health and Care Research, Research Ethics  
259 Committee (Reference 20/HRA/2597); Integrated Research Application System (Project ID 284143).  
260 All study participants were provided with a participation information leaflet at least 48 hours prior to  
261 interview. All participants provided written, or audio recorded consent to participate.

#### 262 Patient and public involvement

263 Neither patients nor the general public were involved in the design, conduct, reporting or  
264 dissemination of our research.

#### 265 **Results**

266 We present findings according to the FCDO principles (Box 1) (key illustrative quotes are summarised  
 267 for each principle in table 2). We then reflect on the findings in light of people-centred health systems  
 268 within the discussion.

Box 1 Ten Principles of Health Systems Resilience in the Context of COVID-19 Response

**Principle 1** Develop flexible pathways for medical supplies  
**Principle 2** Prioritise a list of essential health services [*and continued provision of quality and equitable routine services*]  
**Principle 3** Build trust with local communities  
**Principle 4** Foster good communication at all system levels  
**Principle 5** Support, recognise and encourage staff  
**Principle 6** Facilitate rapid resource flow and greater flexibility in its use  
**Principle 7** Ensure agile tracking of health information  
**Principle 8** Cultivate effective partnerships and networks  
**Principle 9** Structures and mechanisms for advanced preparedness (**New principle**)  
**Principle 10** Adapt governance and leadership structures to facilitate timely decision-making and effective coordination of response (**New principle**)

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270 Table 2 Illustrative quotations from Liberia and Merseyside related to each FCDO Principle

Principle	Comparison	Quotations
<b>Principle 1: Develop flexible pathways for medical supplies</b>	Supply chains disturbed across settings due to global shortages and price inflation. Lack of buffer stock in both settings. Restructuring of supply chains in Liberia led to disturbance for routine supplies.	<p>“Supply chain are affected greatly because their concentration is on how to provide the COVID response activities meaning the ...medicines and medical supplies that are needed [for] NTDs (Neglected Tropical Diseases), lack of attention will now be paid to that.” (LIB national decision maker 029)</p> <p>“With regards to PPE, there was national guidance about what we should do and there was a huge amount of fear amongst nurses and medics and everyone else understandably. Everyone was scared. I was scared. If someone said they weren’t scared, then they’re lying or they’re a fool. The national guidance was confused, and availability of PPE fluctuated. Procurement here [NHS hospital] did a very good job, but sometimes it just wasn’t delivered nationally. And we went through other supply chains...” (LIV hospital decision maker, Merseyside UK 014)</p>
<b>Principle 2: Prioritise a list of essential health services [<i>and continued provision of quality and equitable routine services</i>]</b>	Discontinuation of elective non-urgent care in UK, contrasts with early emphasis on continued routine care in Liberia.	<p>“So we just have to be robust and do the necessary investment into routine health services, preventive in terms of creating awareness and education among health workers about covid and how we can continue to care for our patients, with fighting the infection at the same time.” (LIB national decision maker 001)</p> <p>“There’s the whole big risk around the screening program...the screening program was stopped, restarting that it’s gonna be really</p>

Principle	Comparison	Quotations
		<i>challenging. And I suppose that's another risk in terms of people with delayed diagnosis and the right treatment, as a result of not having had that screening mammograms." (LIV hospital decision maker Merseyside UK 051)</i>
<b>Principle 3: Build trust with local communities</b>	Both settings experiences reduced service utilisation due to loss in community trust. Introduction of innovative follow-up visits to patients led to increased service use in Liberia.	<i>"Some of the useful things that we have been using from Ebola time is, as I said before, to involve the communities ...The community aspect is very important because it will help us for the COVID-19 where communities, family members, all of those at the community level are influential group they will be able to comply like we did in the Ebola." (LIB national decision maker 005)</i> <i>"The elderly population have been shielding because of comorbidities and all that. I think they probably not being as vocal about things that they're concerned about because they're worried about that they will be asked to come in. They fear that that they will catch Covid when they come here." (LIV hospital health worker Merseyside UK 048)</i>
<b>Principle 4: Foster good communication at all system levels</b>	Expansion of virtual communication in both settings. In Merseyside frequently changing guidance from multiple sources created confusion.	<i>"One of the things that quickly used to come to me is to be able to adapt to working with social media technology and all of that, because that's the first thing if you have to communicate with people in this manner you need to understand zooming, skyping, how to take notes.." (LIB national decision maker 029)</i> <i>"And there's so many different sources of information that say different things from what people hear within the hospital talking to friends on the corridor, that you've got to come out with a consistent message. And I think it took longer than was ideal to get a central source of information...But people need to be told what the situation is rather than try to be falsely reassured sometimes as well." (LIV hospital decision maker, Merseyside UK 004)</i>
<b>Principle 5: Support, recognise and encourage staff</b>	Health worker redeployment was common across settings. Health worker training varied in UK according to cadre.	<i>"Like take for example, when COVID came some of our workers from the [name] Hospital was recruited to go at the front line and [hospital name] is for routine services so taking employees from there to go at the front line that tells you it kind of understaff... So routine services kind of slow down and every attention was placed on COVID but going forward, with the system in place, routine services have gotten back on its feet." (LIB national decision maker 010)</i> <i>"And it felt like there was unequal share of knowledge and also an unequal kind of confidence in protective clothing. ... And I think the people that spent the most time with the patient, the patient areas, for instance, the health care assistants and the cleaning staff didn't have all of the information</i>



Principle	Comparison	Quotations
		<i>[at the] beginning or any PPE training.” (LIV hospital health worker Merseyside UK 017)</i>
<b>Principle 6: Facilitate rapid resource flow and greater flexibility in it's use</b>	Prior under-investment in health was common across settings. In Merseyside there was increased funding available and removal of bottlenecks, which enabled swifter action.	<i>“The first thing is, we need ownership by government, ownership is not depending on other countries to provide us the resources, to provide the technical capacity. So that is the best recommendation I would say. The ownership has to be there, resources have to be available and the infrastructure has to be available in terms of being resilient.” (LIB national decision maker 029)</i> <i>“To be honest, it was a fairly novel experience because it was a situation where if we asked we more or less got [funding].” (LIV hospital decision maker, Merseyside UK 004)</i>
<b>Principle 7: Ensure agile tracking of health information</b>	Data quality reduced in Liberia. In Merseyside increased data was collected, but inadequate data analysis measures were put in place.	<i>“Another recommendation is that we could include COVID-19 to our regular disease surveillance. Like we have the measles, the Lassa, and thing. I think we should include COVID because COVID maybe all around. Like we included Ebola, there should be a document on COVID-19 that will form part of our regular surveillance.” (LIB county decision maker 024)</i> <i>“...there's some value in looking at the things that we were looking at before COVID, because at least we have some longitudinal data on that so that we can see what the effect of COVID is.” (LIV hospital health worker, Merseyside UK 020)</i>
<b>Principle 8: Cultivate effective partnerships and networks</b>	Liberia was able to call upon prior decision-making structures (established during Ebola response) to enable swift decisions. Need for stronger engagement between primary and secondary care in Merseyside.	<i>“Involvement of multi-sectorial stakeholders in the response; that was one major thing that we learned from Ebola. And that has been brought to be on this response, so there has been a spark from the level of the presidency where they have key ministries and agency heads heading pillars on the COVID-19 response, involving the community people.” (LIB national decision maker 028)</i> <i>“I think one thing, it's really highlighted is the divide between hospital and primary care. We didn't work together very well before the epidemic, and we are still not working together very well. And I think if things were to get better, the whole health system needs to work better.” (LIV community-level health worker, Merseyside UK 033)</i>
<b>Principle 9: Structures and mechanisms for advanced preparedness</b>	Learning from Ebola prompted rapid preparedness in Liberia, in contrast to Merseyside.	<i>“If you don't prepare well and you are caught unaware you will have a lot of issues, so we didn't wait for COVID to enter Liberia before we prepositioned basic PPE and those are all part of the preparedness phase.” (LIB county decision maker 026)</i> <i>“It was blatantly obvious that anything we've ever planned for in relation to a pandemic or anything along those lines was not the plans that we needed... So I think going forward there needs to be almost a better planning system in place...it's not just a matter of just saying any pandemic it's about</i>



Principle	Comparison	Quotations
		<i>what kind of pandemic.” (LIV hospital decision maker, Merseyside UK 069)</i>
<p><b>Principle 10: Adapt governance and leadership structures to facilitate timely decision making and effective coordination of response</b></p>	<p>Need for rapid guidance from national level to enable sub-national decision making was common in both settings.</p>	<p><i>“So, at this point in time we think if you give the resources, put the money in the hands of the county health team to buy what they need, that will be more effective ... So, we want decision should be given back to the people on the frontline so that they make the decision rather than a centralized point in Monrovia where people sit and decide for people in the lower level and the people choices made the right kind of thing they might need at that level.” (LIB national decision maker 028)</i></p> <p><i>“... we were having to work, to a large extent, in the dark. The amount of guidance that came through nationally and even regionally, was actually relatively limited at that stage and we were having to do what felt like quite a lot of planning in isolation.” (LIV decision maker Merseyside UK 008)</i></p>

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272 Principle 1 Develop flexible pathways for medical supplies: Across both settings supply chains were  
 273 disturbed due to global shortages and price inflation. In Merseyside there was a lack of personal  
 274 protective equipment (PPE) and laboratory reagents needed for COVID-19 testing. Meanwhile, in  
 275 Liberia, the disturbances related to routine supplies as supply chains shifted to focus on COVID-19  
 276 related procurement. In both settings, these challenges were felt to relate to global shortages, but  
 277 were worsened by failure to maintain buffer stocks at local and national levels. In both settings,  
 278 participants expressed the need for greater decentralisation of procurement decisions.

279 Principle 2 Prioritise a list of essential health services [and continued provision of quality and equitable  
 280 routine services]: Participants from Merseyside expressed fears that there was too much emphasis on  
 281 COVID-19 care, at times creating redundant capacity, while limiting access and quality of routine  
 282 essential services. The blanket discontinuation of all elective non-urgent care at the height of the first  
 283 wave in Merseyside, UK was felt to be unhelpful, and a more nuanced approach which seeks to  
 284 balance long-term as well as short term risks associated with health conditions was recommended. In  
 285 contrast, Liberia’s early emphasis on routine health services was described as a key learning prioritised  
 286 by decision-making platforms following the country’s experience with the EVD epidemic.

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3 287 COVID-19 adaptations in the UK led to increased telemedicine, with some respondents raising access-  
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5 288 related equity concerns, particularly for elderly populations, who may struggle to engage with  
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7 289 telemedicine. There were also concerns raised about quality of care, with some participants in  
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10 290 Merseyside fearing delayed-diagnosis, misdiagnosis or sub-optimal care due to restrictions limiting  
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12 291 physical contact with patients. In Liberia, limited opportunities for supervision, diversion of funds and  
13  
14 292 staff for routine services towards COVID-19 response, and limited community outreach activities (due  
15  
16 293 to physical distancing) were felt to impact quality of care. Across both settings innovations in service  
17  
18 294 delivery have emerged (see policy briefs for details).[29,50]

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22 295 Principle 3 Build trust with local communities: In both settings, community trust to seek health  
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24 296 services declined, which reduced utilisation of services. In Liberia, fear among the population during  
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26 297 the start of the pandemic led to reduction in the uptake of health services including national routine  
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28 298 vaccination programmes and health facility-based delivery. This was felt to relate to a combination of  
29  
30 299 fear of contracting COVID-19 at facilities and to reduced community outreach activities. Innovative  
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32 300 community engagement and social mobilization strategies were introduced, for example follow-up  
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34 301 visits to pregnant women, which led to patients returning to use services after a few months. Another  
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36 302 example is the selective outreach home visits by the Neglected Tropical Disease (NTD) programme to  
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38 303 NTD affected patients, in order to avoid interruption in treatment provision. In Merseyside, utilisation  
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40 304 of non-COVID related services remained suppressed for much longer. This was deemed to relate to  
41  
42 305 widespread community mistrust, and Government campaigns which initially discouraged the public  
43  
44 306 from visiting health facilities via the national 'Stay at home' messaging. Applying learning from  
45  
46 307 Liberia's experience with EVD, the Government of Liberia placed a strong emphasis on working  
47  
48 308 alongside community governance structures, involving local authorities as part of COVID-19 response.

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54 309 Principle 4 Foster good communication at all system levels: The need for effective communication  
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56 310 within the health system appeared to be a significant theme, particularly within findings from  
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58 311 Merseyside. The rapidly changing context during the early months of the pandemic created a wealth

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3 312 of daily new information. Virtual forms of communication rapidly expanded in both settings, with  
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5 313 WhatsApp and online meeting platforms used extensively. Within Merseyside, referred to challenges  
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7 314 such as multiple sources of guidance and communication channels struggling to keep pace with the  
8  
9 315 changing guidance, which at times created contradictory messaging and confusion among health  
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11 316 workers. By contrast, Liberia developed a centralised messaging procedure with approval needed  
12  
13 317 from the department of Health Promotion before dissemination. In Merseyside, use of emails were  
14  
15 318 typically less popular with staff as these could often be too long and wordy. Participants expressed  
16  
17 319 limited scope for frontline staff to feedback on the information that had been shared.  
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22 320 Principle 5 Support, recognise and encourage staff: Staff redeployment was common across both  
23  
24 321 settings, contributing to varied workloads. In Liberia, health worker redeployment to COVID-19  
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26 322 treatment centres, alongside largely unchanged utilisation rates contributed to increased workload  
27  
28 323 for remaining health workers responsible for provision of routine services. By contrast in Merseyside,  
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30 324 redeployment resulted in over-staffing in certain COVID-19 wards. Although there was disparity  
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32 325 between health workers, with nurses experiencing increased workload. Due to the reduced volume  
33  
34 326 of patients seeking routine care in the UK, workload was variable for those providing these services.  
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36 327 The degree to which health workers received training about COVID-19 prior to having to manage  
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38 328 COVID-19 patients varied between settings, with Liberia carrying out training in identification,  
39  
40 329 isolation and infection, prevention and control before the first case of COVID-19 arrived in country, as  
41  
42 330 a result of lessons learned following experiences responding to EVD. By contrast in Merseyside, the  
43  
44 331 roll out of training varied widely by cadre, with some participants identifying that health care  
45  
46 332 assistants and cleaning staff did not receive PPE training until later in the pandemic, compared with  
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48 333 doctors and nurses (see table 2).  
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53 334 Anticipated mental health implications for health workers emerged from the Merseyside data, due to  
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55 335 high rates of COVID-19 infection, exhaustion and high future anticipated post-traumatic stress  
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57 336 disorder (PTSD). This was associated with fear of making treatment mistakes, stress surrounding  
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3 337 patient escalation decision making, anxiety over potential COVID-19 infection (both personal and for  
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5 338 family), trauma surrounding high COVID-19 infections and deaths and reduced psychosocial support  
6  
7 339 due to remote working. Measures to support staff wellbeing were introduced (including counselling,  
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9 340 reflective therapy, peer support and mentoring, information made available about local support  
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11 341 services), with varied levels of uptake. This was not widely discussed in Liberia. Although measures  
12  
13 342 in Liberia to support staff wellbeing include psychosocial teams, roaming mental health counsellors  
14  
15 343 providing services to health workers are in place. In Merseyside, community support, strong solidarity  
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17 344 and teamwork were considered enablers of staff resilience.

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22 345 Principle 6 Facilitate rapid resource flow and greater flexibility in its use: Historic underfunding of the  
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24 346 health system in both settings has been highlighted by the pandemic. In Merseyside, this was  
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26 347 considered to be due to nearly a decade of austerity, which has created weariness and uncertainty;  
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28 348 whereas in Liberia it related to perception of reliance on external donors which predated the  
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30 349 pandemic. Our findings confirmed the need for adequate funding to ensure the building blocks of the  
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32 350 health system have received investment prior to the onset of any shock. With the arrival of the  
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34 351 pandemic the availability and flexibility of funding differed between settings. In Merseyside, UK there  
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36 352 was increased central government funding, which was mostly freed of usual bureaucratic checks.  
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38 353 Managers noted that the removal of these bottlenecks allowed for swift action and rapid adoption of  
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40 354 innovations. Frontline managers' ability to make operational decisions was viewed as central to  
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42 355 resilience. In Liberia, however, there was an identified need for greater Government of Liberia  
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44 356 ownership. Some sectors of the health system, particularly those which are donor reliant struggled in  
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46 357 response to reduced partner support following the pandemic. Initially funding was not made  
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48 358 available, however funds for routine service delivery were re-allocated to COVID-19 response, with  
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50 359 implications for quality (see principle 2). Participants complained about excessive bureaucracy  
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52 360 associated with use of funds, which created delays.  
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3 361 Principle 7 Ensure agile tracking of health information: Health information systems (HIS) were rapidly  
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5 362 developed in the UK to collect huge quantities of surveillance data on COVID-19 and essential services.  
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7 363 However, there was need for improved skills to usefully interpret this data. Respondents in Liberia  
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9 364 stated that regular and timely submission of data, particularly from the community level had declined  
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11 365 since the onset of COVID-19. This was considered to relate to reduced data validation, with decreased  
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13 366 supervision visits due to physical distancing. In Merseyside complex new systems were designed to  
14  
15 367 collect pandemic surveillance data, however, data was frequently not analysed or made readily  
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17 368 accessible to staff to influence timely monitoring and quality improvement in services. In Merseyside,  
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19 369 respondents also noted that a number of new initiatives were introduced during the pandemic, such  
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21 370 as virtual consultations, but have not yet been systematically evaluated.  
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26 371 Principle 8 Cultivate effective partnerships and networks: The need for well-established partnerships  
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28 372 emerged in both settings, with Liberia already having clear multi-sectoral participation in decision-  
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30 373 making following the Incident Management System developed following EVD. Merseyside data  
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32 374 highlighted pre-existing weaknesses in collaboration between primary and secondary/ tertiary care  
33  
34 375 have been exacerbated. In both settings the need for greater engagement with the private sector  
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36 376 was affirmed, with respondents from UK highlighting the need for stronger links regarding PPE supply  
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38 377 chain shortages and in Liberia the need to strengthen collaboration given perceived weakness in  
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40 378 private facility IPC standards. Partnerships were established within Merseyside, in a range of aspects  
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42 379 of service delivery, including: regional network of laboratory providers to address equipment  
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44 380 challenges and ensure COVID testing; between GPs to create service hubs; between disciplines and  
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46 381 departments within hospital to address staff shortages and share information. In Liberia, a reduction  
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48 382 in the number of partners providing response support was noted. This was a marked contrast to the  
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50 383 EVD response.  
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56 384 Principle 9 Structures and mechanisms for advanced preparedness (newly identified principle from  
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58 385 our findings): Within Liberia in particular, but also in Merseyside, there was discussion about  
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3 386 advanced preparedness. Respondents in Liberia emphasised how their experiences with previous  
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5 387 shocks, particularly EVD, had facilitated learning around early recognition of the need for  
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7 388 preparedness. For instance, there was consensus among respondents that waiting for COVID-19 to  
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9 389 reach Liberia before responding would be too late. There was early rapid mobilisation of existing  
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11 390 emergency response systems which had been established during the EVD response including; health  
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13 391 check controls and quarantines at border points from January 2020; health worker COVID-19 training  
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15 392 before the first confirmed case; enhanced hygiene practices; restriction of physical contact and  
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17 393 sustained use of PPE, building on institutional memory gained through the EVD epidemic. In contrast,  
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19 394 respondents in Merseyside expressed that the COVID-19 response was impeded by a lack of pandemic  
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21 395 preparedness for new emerging infectious diseases.

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26 396 Principle 10 Adapt governance and leadership structures to facilitate timely decision-making and  
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28 397 effective coordination of response (newly identified principle from our findings): Being able to adapt  
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30 398 governance and leadership structures to facilitate timely response coordination emerged from both  
31  
32 399 settings. Liberia had previously established the incident management system (IMS) in 2014 as part of  
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34 400 the response to EVD. It was re-activated in March 2020 to guide planning their pandemic response,  
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36 401 led by the Minister of Health. This multi-sectoral team included a range of political and public health  
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38 402 decision-makers, donors and partner representatives. At the time the study was carried out, most  
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40 403 decisions were made centrally, with implementation at county level. In Merseyside, early response  
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42 404 was hindered by slow and centralised guidance and decision-making, which was perceived to be  
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44 405 oriented towards achieving political goals, rather than providing much needed clarity and recognition  
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46 406 of local reality. The limited scope for local autonomy was considered to strain relationships between  
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48 407 local senior leadership who sought to enforce central directives, and frontline staff, who wanted scope  
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50 408 to influence them. In both settings, there was interest in greater de-centralisation of decision-making  
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52 409 to lower levels.

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58 410 **Discussion**  
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3 411 Our findings demonstrate the commonalities between the principles for resilience and people-centred  
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5 412 health systems (Figure 2). We believe that maintaining a people-centred approach can help ensure  
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7 413 that COVID-19 related adaptations are acceptable, understood and meet the needs of individuals  
8  
9 414 (both patients and health workers). The values which underpin people-centred health systems  
10  
11 415 emphasise the need for equity, orienting health services towards a health system which puts “people  
12  
13 416 and communities at their centre, and surrounds them with responsive services that are coordinated  
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15 417 both within and beyond the health sector, irrespectively of country setting and development  
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17 418 status.”(page 9 [14])  
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### 22 419 **Adapting a people-centred framework**

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24 420 All ten FCDO principles (eight original principles and two principles identified through this study) are  
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26 421 mapped against the original conceptual framework, to demonstrate the connection between our  
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28 422 findings and existing literature about resilience (Figure 2) and recommendations in response to each  
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30 423 principle are outlined in box 2.  
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34 424 Figure 2 placed here  
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426 **Capacity and knowledge exchange**

427 The continuation of routine essential service delivery following a shock to the health system, has

428 previously been highlighted as an area of concern across a range of sectors.[51,52] Health systems

*Box 2 Recommendations from our adaptation of FCDO principles*

1. Supply chains should pre-position adequate stocks, diversify sources and seek decentralisation of procurement. Collaboration between providers can prove valuable in securing continuity of supplies.
2. Routine services should be prioritised with a view to long term as well as short term impact, with prioritisation re-evaluated regularly as the pandemic progresses.
3. Maintain consistent communication and engagement with community leaders as partners to participate in pandemic planning within their respective communities.
4. Keep communication channels open, with regular updates for staff which highlight the key information, preferably through meetings, rather than email.
5. Ensure adequate provision of training, with sufficient PPE for health staff particularly for those staff at highest risk of COVID-19 infection, alongside measures to balance workload and promote staff wellbeing. Prioritise compassionate leadership which is supportive of staffing levels and rotas, along with staff mental wellbeing. Investment in psychosocial wellbeing throughout and after the pandemic response.
6. Health systems need to be adequately funded during 'normal times' if they are to be able to respond when a shock arises. There is urgent need for investment to clear the backlog of delayed routine services.
7. Health information systems need greater investment in both the systems and the human element to be able to analyse, interpret and respond to emerging data trends.
8. Opportunities for multisectoral collaboration should be sought out, with engagement with private sector where possible.
9. Develop a proactive approach, with advance plans for health shocks, along with escalation and de-escalation plans throughout the crisis.
10. Promote greater opportunities for de-centralised staff involvement in decision-making where feasible. Governments to prioritise an outward focus towards global solidarity.

429 need the capacity to continue to deliver services of good quality alongside responding to wider health

430 challenges.[42] Our findings for principle 2 highlighted that COVID-19 adaptations in the UK led to the

431 cancelling or postponing of many essential services, including those related to cancer care, which has

432 been anticipated to decrease life expectancy and survival.[52,53] Meanwhile, Liberia emphasised the

433 need for continuation of routine services and the promotion of patient confidence to use these

434 services. This is in contrast to the EVD epidemic, where over 80% reductions in maternal delivery care



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3 435 in EVD affected areas were described and form part of the reason why routine care was prioritised so  
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5 436 strongly as part of the COVID-19 response.[54]  
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8 437 Our findings relating to supply chain (principle 1) resonate with literature from previous shocks and  
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10 438 research emerging from the COVID-19 pandemic.[55,56] We found the need for greater flexibility,  
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12 439 with engagement with a more diverse range of suppliers and greater decentralised control over supply  
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14 440 chain across both settings. This is in keeping with a recent systematic review of supply chain resilience  
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16 441 literature, which identified the importance of diversity and the social aspects of supply chains during  
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18 442 a pandemic response.[55] Supplying commodities without investing in health systems strengthening  
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20 443 will not produce a robust supply chain, limiting ability to respond quickly and effectively to future  
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22 444 demands.[55]  
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27 445 We found a strong focus on the need for support for the health workforce, particularly in UK (principle  
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29 446 5). This was not as widely discussed in Liberia (though this may be a limitation relating to differing  
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31 447 levels of participants between countries). However, a previous study in Sierra Leone and Liberia,  
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33 448 highlighted that many providers may carry unresolved trauma from earlier shocks (including the Ebola  
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35 449 epidemic), which may have implications for them during the COVID-19 response.[57,58] Research  
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37 450 among health workers treating patients with COVID-19 in China, revealed health workers had a higher  
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39 451 prevalence of insomnia, anxiety, depression, somatisation and obsessive-compulsive symptoms  
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41 452 compared with nonmedical health workers, indicating the need for support and recovery programs  
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43 453 for these staff.[59] Stressors identified among workers in China, include many of those described by  
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45 454 participants in both settings within our study, particularly within Merseyside, including difficulties  
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47 455 feeling safe at work, lack of infection prevention and control (IPC) measures and COVID-19 knowledge,  
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49 456 long term workload, high risk of exposure to COVID-19, shortage of PPE and lack of rest, among  
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51 457 others.[59]  
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56 458 Our findings regarding resource flow to frontline providers (Principle 6), are in keeping with previous  
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58 459 study which identified funding as a core dimension within a health systems' ability to adapt and  
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3 460 respond to shocks.[60] A recent systematic review found aggregate public spending for health is  
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5 461 associated with improved life expectancy, reduced child and infant mortality and more equitable  
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7 462 health outcomes.[56]  
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### 10 463 **Relational and teamwork components**

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13 464 The relational components which exist are shaped by risk, trust, values, power, norms, and  
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15 465 culture.[42] These components play a role in determining the success (or failure) in response to a  
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17 466 health systems shock or crisis. In contrast to the FCDO recommendation for good communication  
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19 467 between actors (principle 4), our findings highlight challenges, particularly in the UK, where  
20  
21 468 communication channels struggled to keep pace with changing guidance creating contradictory  
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23 469 messaging and confusion among health workers. This is in keeping with previous study which found  
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25 470 differences in lines of authority and acceptability of communication pathways can contribute to  
26  
27 471 problems in communication.[34] In response, key principles were identified including participation  
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29 472 for all, respect, information sharing, collaboration and problem-solving.[34]  
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34 473 The need for strong governance structures and leadership which adapts to the response (principle 10),  
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36 474 was identified as a gap within early response in Merseyside. This was felt to have been hindered by  
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38 475 slow and centralised guidance and decision-making with a perceived limited scope for autonomy  
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40 476 within decision-making at lower levels. Within Liberia learning from the EVD response, and  
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42 477 establishing an incident management system (IMS) (led by the Minister of Health) and Special  
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44 478 Presidential Advisory Committee on Coronavirus (SPACC) (led by the President) early in planning their  
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46 479 pandemic response enabled timely decision-making.[27] In both settings, there was interest in greater  
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48 480 de-centralisation of decision-making to lower levels. Blanchet et al (2017) emphasised the need for  
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50 481 legitimacy within resilience, with requirement of capacity to develop socially and contextually  
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52 482 accepted institutions and norms.[40]  
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57 483 Looking more broadly, the conceptual framework highlights community engagement, with the  
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59 484 community being active participants of any health systems response (principle 3).[39] Our findings  
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3 485 emphasise the value of community engagement within the response within Liberia, based on lessons  
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5 486 from the EVD pandemic and in keeping with WHO recommendation that this be a key pillar within  
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7 487 COVID-19 country response.[8] Liberians across all socio-demographic groups responding to a recent  
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9 488 survey said they were very well, or somewhat well informed about the COVID-19 pandemic, with only  
10  
11 489 5% feeling not very well/ not at all informed.[27] This also emerged as a key finding in Singapore, with  
12  
13 490 engagement through new and social media channels monitored, with clarification of misinformation  
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15 491 by MOH.[61] In contrast to the findings from Liberia, participants from Merseyside highlighted the  
16  
17 492 need for stronger communication (although there were some examples of creative ways to engage  
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19 493 with diverse communities).

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24 494 Learning from our study has emphasised the need to better prepare for, and respond to, health  
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26 495 emergency crises through integrated services (Principle 9).[44] A recent survey found most of the  
27  
28 496 population felt the Liberian government was doing well in managing the pandemic.[44] This  
29  
30 497 contrasted with findings from the UK where there was felt to have been a lack of adequate advance  
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32 498 planning and preparation. Two previous literature reviews highlighted that “preparedness depends  
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34 499 on health systems ability to learn from prior pandemics”, with responses often reactive rather than  
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36 500 proactive.[56,62]

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40 501 The people-centred approach stresses the need for awareness and recognition of the  
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42 502 interdependencies of the health system with the community and other social systems, including  
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44 503 education, social protection and food security and their relationship with social determinants of health  
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46 504 (principle 8).[63] Our findings emphasise the need for strong partnerships with other sectors across  
47  
48 505 settings, in keeping with an identified success in Singapore’s response,[61] and is a key aspect of  
49  
50 506 Blanchet et al.’s resilience framework, ensuring the capacity to engage with and handle multiple actors  
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52 507 and dynamics.[40]

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56 508 Our findings, particularly from Merseyside emphasise the vast quantities of data being generated  
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58 509 through the COVID-19 response, but there are gaps in how this data is analysed and utilised within the  
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3 510 health system. The importance of adequate HIS is in keeping with previous studies.[40,60] A health  
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5 511 system's ability to identify and respond to an emerging threat is needed if it is to appropriately meet  
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7 512 emerging needs during a rapidly evolving health crisis or shock (principle 7).[40,41] A robust health  
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9 513 management information system (HMIS) is crucial to a health systems capacity to respond to  
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11 514 shock.[60] Health systems need to have the ability to combine and integrate different forms of  
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13 515 knowledge and to anticipate and cope with uncertainties and unplanned events.[40]  
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17 516 COVID-19 has reflected and exacerbated existing social inequalities and emphasised the importance  
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19 517 of global collective action, rather than an individual response for genuine resilience. [8] Vaccine  
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21 518 inequity and a lack of global solidarity on the part of some richer countries, are dominating the current  
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23 519 phase of the pandemic. Our findings seek to highlight opportunity for shared learning across settings  
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25 520 in the Global South and North, emphasising the need for a global response to this and future shocks.  
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### 29 521 **Strengths and Limitations**

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32 522 The strengths of this study include the quality of data analysis, which involved a wide range of  
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34 523 researchers across both settings, and the breadth of perspectives captured from frontline staff and  
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36 524 key decision-makers early in the course of the pandemic. Our study had a number of limitations.  
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38 525 Within Merseyside, study participants were selected from across a range of health system levels  
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40 526 including primary care, hospital frontline workers and decision-makers as well as regional decision-  
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42 527 makers. By contrast, in Liberia participants included national and county level decision-makers,  
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44 528 technicians and supervisors of frontline staff, with no direct frontline workers included. This may  
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46 529 result in some of the differences in findings, related to these differing perspectives. Perhaps the  
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48 530 greatest limitation of this study is that it was carried out at a single point in time. In Merseyside we  
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50 531 collected data towards the end of the first wave, at a time when there were few inpatients and people  
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52 532 were reflecting on the first wave. Meanwhile in Liberia it was carried out before there had been a  
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54 533 large increase in cases. Since the study was carried out there have been subsequent even greater  
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56 534 waves of cases within Merseyside, UK and Liberia has experienced a large surge in cases of the delta  
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3 535 variant (59% of cases recorded in Liberia up until 17<sup>th</sup> July 2021, occurred during a six week period  
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5 536 from June 1 2021 to 17<sup>th</sup> July 2021).[64] By the weeks beginning July 24<sup>th</sup> to August 7<sup>th</sup> 2021 number  
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7 537 of confirmed cases had declined between zero to 43. Response measures have evolved in both  
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9 538 settings, and limitations identified through the study may have been addressed in subsequent stages  
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11  
12 539 of the pandemic.

## 15 540 **Conclusion**

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18 541 We found the ability of health systems to be able to absorb, adapt and transform in response to the  
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20 542 COVID-19 pandemic in two very different settings closely relates to the eight FCDO principles of  
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22 543 resilience.[16,40] We expanded these principles to include strong structures and mechanisms for  
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24 544 advance preparation, and adaptable governance and leadership structures to facilitate timely  
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26 545 decision-making and response coordination. At the heart of our findings lies the centrality of the  
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28 546 people-centred health system, where the person, is placed within their family, community and the  
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30 547 health system.[14] When all aspects work together the outcome is the extent of resilience  
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32 548 demonstrated within a health system in response to shock.[40] This includes both the provision of  
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34 549 specific services in response to the shock experienced, as well as continued provision of and demand  
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36 550 for 'routine care'. Our study highlights the need to maintain a people-centred approach for a resilient  
37  
38 551 health system response.

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7

8 562 **Competing Interests**  
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10  
11 563 None declared.  
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14 564 **Author Statement**  
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16  
17 565 RM prepared the first draft of the paper with inputs from all; Study design, conceptualisation, ethics  
18  
19 566 (ST, LD, MT, LF, IB, ZZ, RM, VW, HP, RAdC, RH, KK); conducted interviews in UK – RM, VW, MT, KO, HP,  
20  
21 567 SC, ST, TEH, RH, RD, YD, OH; conducted interviews in Liberia - ZZ, WT, HB, JK, JSS, CP, GZ, RM. All  
22  
23 568 interviewers participated in the cross-country analysis which was led by YA in the UK with inputs from  
24  
25 569 those who conducted UK interviews and LD, RM, ZZ, HB, WT, JK, JSS, GZ, CP in Liberia. All authors were  
26  
27 570 involved in critical review of the approach, inputted into and approved the final draft of the  
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29 571 manuscript.  
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33 572 Figure 1 caption: Conceptual framework  
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36 573 Figure 2: Principles for resilience and people-centred health systems framework  
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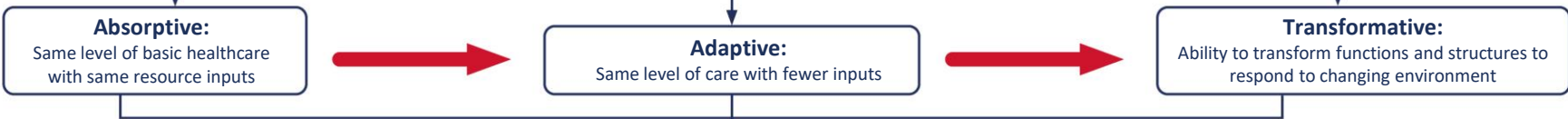
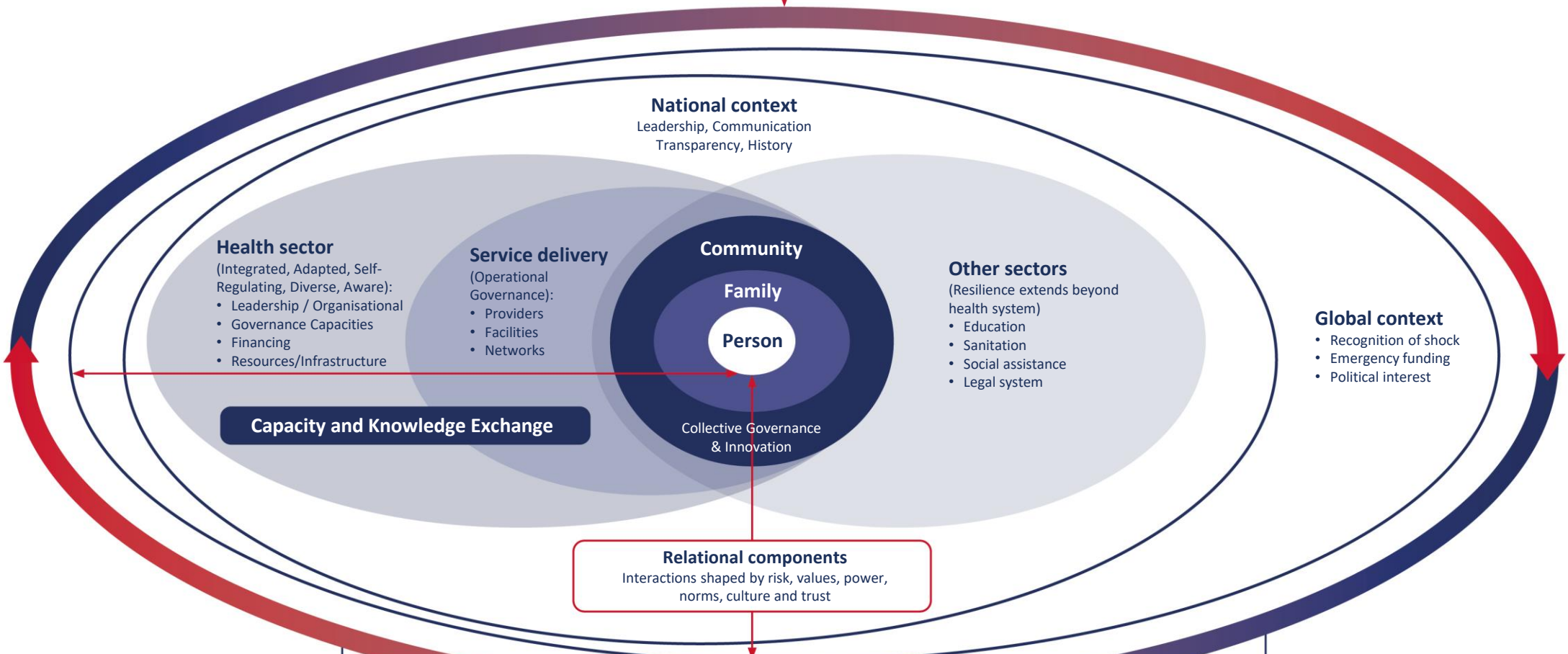
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**NATURE OF THE SHOCK - CONFLICT, TERRORIST ATTACK, INFECTIOUS DISEASE OUTBREAK, NATURAL DISASTER, FINANCIAL, MIGRATION, CLIMATE CHANGE, CHRONIC CHALLENGES, OTHER**

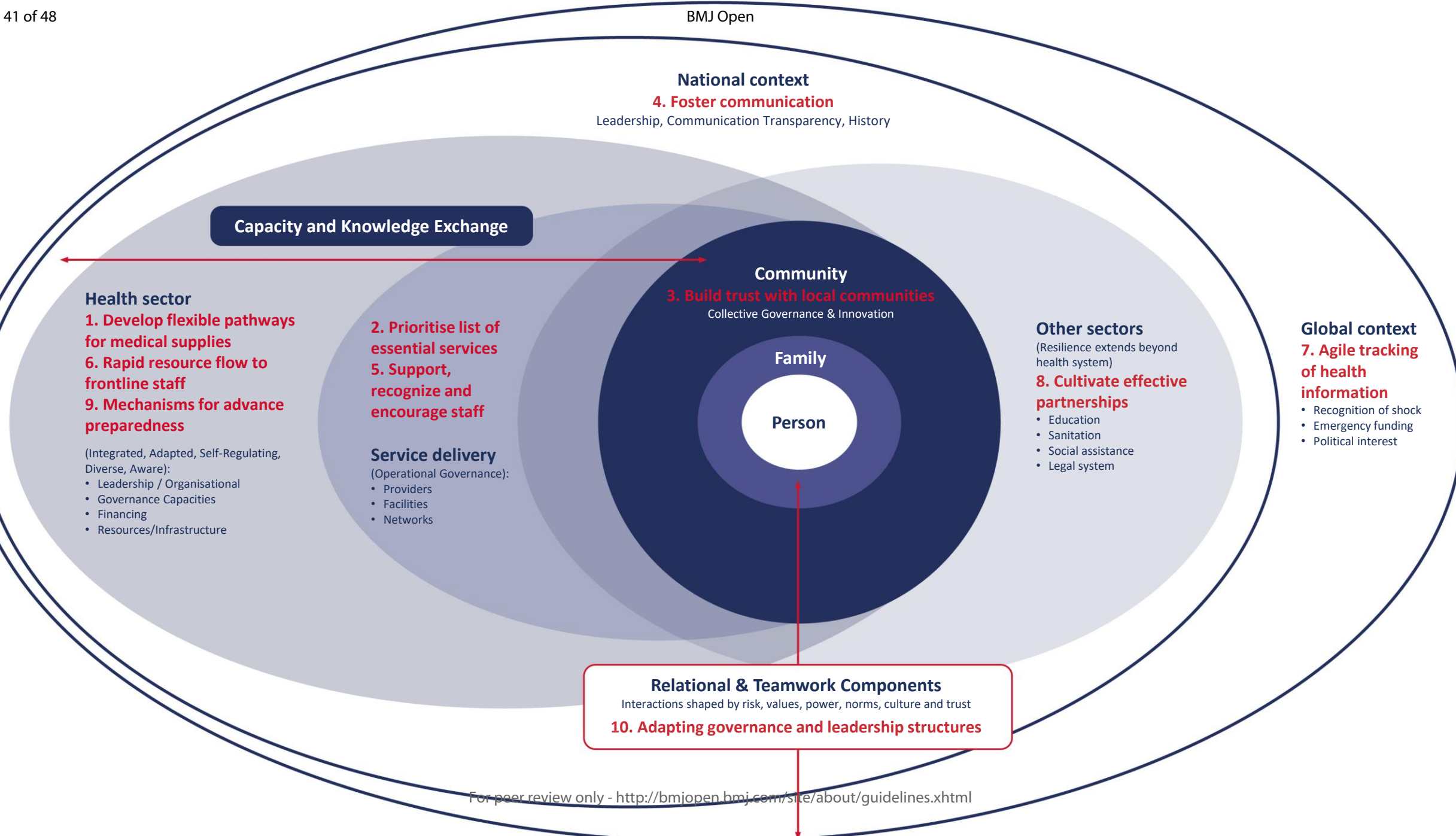


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**Resilience**

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Appendix 1: COVID-19 Key Informant Interview Topic Guides

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## Key Informant Interviews Topic Guide –MOH Liberia

All possible questions to be asked of key informants are described in the following guide. Prior to interviewing each stakeholder, specific guides for these individuals will be made. One interview that covers relevant research themes will be completed with each stakeholder. Ordering of questions will also be revised to ensure logical flow through the interview and to avoid repetition.

### Background

Please can you tell me your position and how long you have worked in your current role?

How has your role changed due to the current COVID-19 crisis?

### Responses to Shock and the General Health System

1. How do you think the health system has coped with the COVID-19 crisis? How did it compare with previous crisis? How have routine services been impacted?
2. How is the current shock (COVID-19) the health system is experiencing similar or different to those you have experienced before?
3. What are the key learnings from previous shocks (Ebola/ conflict/ economic crisis)? How are they being used to respond now?
4. How do you think routine health systems functions are being impacted by the current crisis (COVID19/economic)?
5. What do you think could be done to support continuation of routine services? How is this informed or shaped by learnings from during the Ebola period?
  - a. How would you describe the quality of services usually? How is quality of care being maintained throughout the COVID-19 response?
6. What policy or guidelines are supporting with the current COVID response? What additional guidelines or policies could be helpful for the COVID response?

### Service Specific Impacts

**Questions in this section to be reviewed/modified for cross-cutting MOH functions, e.g. M&E, research division prior to starting interview**

7. Can you tell me about how service delivery within your programme/section (adapt to include name of section depending on who talking too) has been affected by the COVID pandemic?
  - a. Which of your services would you say have been most impacted so far? Why?
  - b. Which services would you envisage will be most impacted moving forwards? Why?
8. How have your routine services been modified or adapted? Which components of your service do you view as essential? Why?
9. Which specific sub-populations is routine care most impacted for? Are there any marginalised groups who may struggle to use services since the onset of the COVID-19 crisis? (Probe: e.g gender, dis/ability, rural/urban; wealth; geographic regions; age etc)
10. Have there been any innovations within service delivery in response to the COVID-19 crisis, and have they been useful in any way?
11. Has there been any innovations in response to COVID-19 that have concerned you?

### Human Resource Management

12. How have you planned for staffing to meet the changing additional workload in response to COVID? Any tools/ guidance from the human resource section? Successes and challenges? (Prompt for role of new community health cadres, for those providing face to face care and for MOH staff)
13. What additional skill development have you provided and how in response to COVID? Successes and challenges?
14. How are you able to support staff so they can continue to work effectively during the COVID pandemic
  - a. How have you supported staff through communication?
  - b. How have you supported staff for occupational safety including PPE?

COVID-19 Key Informant Interview Topic Guides

- c. How have you supported staff through with psychosocial support?
- d. What have been the successes and challenges with supporting staff?

### Service and System Impacts: Governance and Decision Making

**Questions in this section to be reviewed/modified to make these questions more service-specific, depending on the interviewee's programme area**

15. How are decisions made about which services should or should not be prioritised as part of the COVID response? (prompt for in relation to their specific service and also in relation to general health system, prompt for donor influence)
16. How does decision-making as part of the COVID response influence routine planning activities? What has been the impact of resource re-distribution as part of the COVID response?
17. Who is involved in this decision making and what are the processes? What are the challenges?
18. What do you think are the key ethical impacts of making these decisions? What ethical guidelines are currently in place and important in decision making during this period?
19. What guidance documents are available to support you in making decisions regarding COVID?
20. What guidance documents would help to support maintaining routine services?

### Closing Questions

21. What does a resilient health system look like to you? What are your three recommendations would you make to improve or maintain the resilience of the Liberian health system during this period?
22. What are your three recommendations would you make post crisis to ensure the return to routine function of the health system as effectively as possible?

Additional questions for Director of personnel only

23. What are the main sources of additional staffing (e.g. secondment/redeployment, task-shifting, improved productivity, early graduation/students, returnees, volunteers)? Successes and challenges? Optional: Impact on the wage bill?
24. What areas of service are now struggling with staffing?
25. What are you able to do to retain staff? Successes and challenges?
26. What impact did/is down-sizing of "non-essential staff" have on your programme during the crisis?

Thank-you

Any other comments?

## Key Informant Interviews Topic Guide –Merseyside Regional Decision Makers

### Version 1.1\_01052020

All possible questions to be asked of key informants are described in the following guide. Prior to interviewing each stakeholder, specific guides for these individuals will be made. One interview that covers relevant research themes will be completed with each stakeholder. Ordering of questions will also be revised to ensure logical flow through the interview and to avoid repetition.

### Question List

#### Background

Please can you tell me your position and how long you have worked in your current role?

#### Impact of COVID 19 on Routine Service Delivery

1. What are defined as essential routine services?
2. Which are the main scheduled and unscheduled services affected by COVID-19 and how have these been adapted over time?
3. Have there been any innovations within service delivery, and what have these been?
4. Have there been any changes that have concerned you? Why?
5. What would help to support maintaining routine services?

#### Governance and Decision Making

6. What has informed your decision-making, such as guidance documents or governance decision-making processes?
7. Who is involved in decisions made about which services should or should not be prioritised?
8. How are decisions made about which services should or should not be prioritised?
9. Describe how and who is involved in operationalising decisions?
10. What challenges have you faced in making these decisions?
11. What are the main differences between various sites in the trust, especially between Aintree and the Royal Hospitals?
12. How are changes in service delivery communicated? How can this be improved? There are multiple guidelines at national and local levels, how are these disseminated? How well does this work? How rapidly? How do health care workers respond to these changes?

#### Human Resource Management

13. How have you [may be the employer in general] planned for staffing to meet the changing additional workload? Any tools/ guidance from national authorities? Successes and challenges?
14. How have you planned for the increase in staff absence?
15. What additional skill development have you provided and how? What have been the successes and challenges?
16. How are you able to support staff so they can continue to work effectively (e.g. communication, occupational safety including PPE, psychosocial support)? What have been the successes and challenges?

#### Recovery post COVID-19

17. Are there any COVID-19-related changes to routine health services that you think it would be useful to continue after COVID-19? Which ones and why?
18. What next steps do you believe should be taken now to support the health system to recover post COVID-19?

## COVID-19 Key Informant Interview Topic Guides

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3 Thank-you

4 Do you have any further suggestions for improvements to delivery of routine services?

5 Any other comments?  
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## Key Informant Interviews Topic Guide – Health Workers

### Version 1.1\_01052020

All possible questions to be asked of key informants are described in the following guide. Prior to interviewing each stakeholder, specific guides for these individuals will be made. One interview that covers relevant research themes will be completed with each stakeholder. Ordering of questions will also be revised to ensure logical flow through the interview and to avoid repetition.

### Question List

#### Background

Please can you tell me your usual position and how long you have worked in that role?

Are you currently working in your usual role and department?

If no, what role and department are you now working in?

#### Impact of COVID 19 on Routine Essential Service Delivery

1. Can you tell me about how health service delivery has been affected by the COVID pandemic? What was the processes for this, how was it communicated and do you have any ideas about how this can be improved? How prepared did you feel for these?
2. What do you consider to be routine essential health services in your work?
3. Which are the main scheduled and unscheduled services affected by COVID-19 in your department and how have these been adapted over time?
4. What have been the strengths and challenges with these changes? How has quality been affected?
5. How should these changes be evaluated? What indicators should be used?
6. What is worrying you most about your service now?
7. Which services would you envisage will be most impacted moving forwards as the pandemic progresses? (e.g. hospital based, community care, disease specific services, etc) Why?
8. Who do you think are the people most impacted by the changes in routine service delivery? Would you say that patients with specific socio-demographic characteristics are more impacted by service disruption/distortion than others? Why? (e.g. gender, dis/ability; rural/urban; wealth; geographic regions; age etc) What can be done to ensure that these patients can still use health services when they need them?

#### Ethics and Decision Making

9. Have you encountered any health systems issues which you found troubling since the start of the COVID-19 pandemic? Would you be willing to tell me more about these issues?
10. What is the impact of these issues on you as a health worker? What would be helpful to support you in dealing with these issues?
11. Do you know of any ethical guidelines in place to guide you as you make difficult decisions during this time? What are these? How are these ethical guidelines operationalised? Are they useful?
12. Have you been involved with making decisions about the changes to health services since the COVID-19 pandemic? What was your role in making these decisions? How were these decisions made?
13. When there are changes in how health services are delivered how are these communicated with you? How has this worked? What do you think is the best way to be informed?

#### Human Resource Management

14. How has your role changed since the start of the COVID-19 pandemic? What have been the successes and challenges with how your role has changed? Probe workload
15. Is there anything about your role that concerns you? What?
  - a. Probe working outside are of expertise
  - b. No indemnity if make an error
  - c. Communication about working across disciplines

## COVID-19 Key Informant Interview Topic Guides

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3 16. What preparation for the changes to your role have you had and how was it delivered (skills - key ones,  
4 psychological support)? What have been the successes and challenges?  
5 a. Probe PPE training  
6 b. COVID clinical training  
7 c. Support mechanisms  
8 d. Team formation  
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10 17. What kind of support (e.g. communication, occupational safety including PPE, psychosocial support) are  
11 you receiving to do your job from your team/manager/employer? What have been the successes and  
12 challenges?

### 13 **Recovery post COVID-19**

- 14 18. Are there any COVID-19-related changes or innovations to routine health services that you think it would  
15 be useful to continue after COVID-19? Which ones and why?  
16 19. What next steps do you believe should be taken now to support the health system to recover post COVID-  
17 19?  
18 20. What is worrying you most as the response moves forward?

21 Thank-you

22 Do you have any further suggestions for improvements to delivery of routine services?

23 Any other comments?  
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## Key Informant Interviews Topic Guide –Merseyside Laboratory and Blood Transfusion Staff

### Version 1.1\_01052020

All possible questions to be asked of key informants are described in the following guide. Prior to interviewing each stakeholder, specific guides for these individuals will be made. One interview that covers relevant research themes will be completed with each stakeholder. Ordering of questions will also be revised to ensure logical flow through the interview and to avoid repetition.

### Background

Please can you tell me your position and how long you have worked in your current role?

### Governance and Decision Making - Relating Directly to COVID-19

1. What has been the decision-making process for the laboratory's response to COVID-19 testing services and when did discussions start around re-adjusting services for COVID-19?
2. Who held overall responsibility for how COVID-19 testing was going to be conducted at LCL?
3. In addition to PHE, have the Liverpool Clinical Laboratory services worked closely/ collaborated with any other external partners for COVID-19 testing? If so whom and in what capacity?

### Governance and Decision Making - Relating to Maintaining Routine Service Delivery

4. How are decisions made about which services should or should not be prioritised; which ones were considered to be essential and why? Who is involved in this decision making? How were these decisions communicated?
5. What guidance documents were most useful to you in making these decisions? In what way were they useful?
6. What key challenges have you faced in making these decisions? Do you have any support needs here?

### Impact of COVID-19 on Routine Laboratory Service Delivery

7. Can you tell me about how routine clinical laboratory service delivery has been affected by the COVID pandemic?  
COVID-19 Testing service specific
8. How did the laboratories adapt to scale up COVID-19 testing? (analysers, staff capacity, staff training, standard operating procedures, risk assessments)
9. What challenges did the laboratory face when implementing COVID-19 testing? How were they overcome? What worked well? (e.g. resources, human resource, process change, governance, culture, leadership etc)
10. Which routine services would you envisage will be most impacted moving forwards? (e.g. hospital based-testing, disease specific services, etc) Why?

### Recovery post COVID-19

11. Are there any COVID-19-related changes to the laboratory service that you think it would be useful to continue after COVID-19? Which ones and why?
12. What next steps do you believe should be taken now to support the laboratory system to recover post COVID-19?
13. Are there any changes/ innovations introduced in response to COVID-19 changes which you think should be continued? Why?

Thank you

Do you have any questions for me? Resources (re labs) link <https://www.rcpath.org/uploads/assets/90111431-8aca-4614-b06633d07e2a3dd9/Guidance-and-SOP-COVID-19-Testing-NHS-Laboratories.pdf>

COVID-19 Key Informant Interview Topic Guides



Table 1 Standards for Reporting Qualitative Research (SRQR)

Standard	Page number
S1 Title	P1, line 1-2
S2 Abstract	P2, line 12-35
S3 Problem formulation	P3 line 53-75
S4 Purpose of research question	P4, line 78-124
S5 Qualitative approach and research paradigm	P11 line 229-232
S6 Research characteristics and reflexivity	P8 line 165-190
S7 Context	P7 line 129-164
S8 Sampling strategy	P10 line 200-212
S9 Ethical issues pertaining to human subjects	P11 line 255-262
S10 Data collection methods	P8 line 167-171
S11 Data collection instruments and technologies	P9 line 191-198
S12 Units of study	P10 line 219-224
S13 Data processing	P11 line 224-226
S14 Data analysis	P11 line 232-249
S15 Techniques to enhance trustworthiness	P 11 line 226-227
S16 Synthesis and interpretation	P 13 line 267-410
S17 Links to empirical data	P13 line 267-272
S18 Integration with prior work, implications, transferability, and contributions to the field	P21 line 411-523
S19 Limitations	P27 line 524-542
S20 Conflicts of interest	P28 line 565-566
S21 Funding	P28 line 558-562

# BMJ Open

## Qualitative study exploring lessons from Liberia and the UK for building a people-centred resilient health systems response to COVID-19

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Manuscript ID	bmjopen-2021-058626.R2
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1 **Title Qualitative study exploring lessons from Liberia and the UK for building a people-centred**  
2 **resilient health systems response to COVID-19**

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## 12 **Abstract**

13 Introduction: COVID-19 has tested the resilience of health systems globally and exposed existing  
14 strengths and weaknesses. We sought to understand health systems COVID-19 adaptations and  
15 decision-making in Liberia and Merseyside, UK.

16 Methods: We used people centred-approach to carry out qualitative interviews with 24 health decision-  
17 makers at National and County Level in Liberia and 42 actors at County and hospital level in the UK  
18 (Merseyside). We explored health systems' decision-making processes and capacity to adapt and  
19 continue essential service delivery in response to COVID-19 in both contexts.

20 Results: Study respondents in Liberia and Merseyside had similar experiences in responding to COVID-  
21 19, despite significant differences in health systems context, and there is an opportunity for multi-  
22 directional learning between the global south and north. The need for early preparedness; strong  
23 community engagement; clear communication within the health system, and health service delivery  
24 adaptations for essential health services emerged strongly in both settings. We found the Foreign,  
25 Commonwealth and Development Office (FCDO) principles to have value as a framework for reviewing  
26 health systems changes, across settings in response to a shock such as a pandemic. In addition to the  
27 eight original principles, we expanded to include two additional principles; 1) the need for functional  
28 structures and mechanisms for preparation and 2) adaptable governance and leadership structures to  
29 facilitate timely decision-making and response coordination. We find the use of a people-centred  
30 approach also has value to prompt policy makers to consider the acceptance of service adaptations  
31 by, patients and health workers, and to continue the provision of 'routine services' for individuals  
32 during health systems shocks.

33 Conclusion: Our study highlights the importance of a people-centred approach, placing the person at  
34 the centre of the health system, and value in applying and adapting the FCDO principles across diverse  
35 settings.

## 36 **Strengths and Limitations of the Study**

- 37 • A key strength of this study is the multi-directional learning between health systems in the global  
38 south and global north, which involved a wide range of researchers across both settings, and the  
39 breadth of perspectives captured from frontline staff and key decision-makers.
- 40 • We find that the FCDO principles can be usefully applied across diverse contexts, with  
41 identification of two additional new principles, related to mechanisms for advanced preparedness  
42 and adaptable governance and leadership structures.
- 43 • The greatest limitation of this study is that it was carried out at a single point in time, towards the  
44 end of the first wave in the UK and before there had been a large increase in cases in Liberia.  
45 Response measures have evolved in both settings in subsequent stages of the pandemic.
- 46 • The study was limited by the differing range of respondents across study settings, with  
47 participants from across a range of health system levels including primary care, hospital frontline  
48 workers and decision-makers as well as regional decision-makers within Merseyside, UK;  
49 compared with national and county level decision-makers, technicians and supervisors of frontline  
50 staff in Liberia, which may result in differing perspectives.

51

## 52 Introduction

53 The COVID-19 pandemic has forever altered our world. Its impact has been felt across all nations,  
54 demonstrating the importance of resilient health systems in protecting global health security.[1]

55 Health systems have been forced to adapt to new ways of working alongside the continued provision  
56 of essential services including: prevention of communicable diseases; sexual and reproductive health;  
57 care for vulnerable populations; ongoing management of chronic illness (including mental health  
58 conditions); continuity of critical inpatient therapies; management of emergency health conditions;  
59 and auxiliary services, including diagnostic imaging, laboratory and transfusion services.[2]

60 In April 2020, the United Nations expressed concern that, within Africa, up to 3.3 million people could  
61 lose their lives as a direct result of COVID-19 and many more through the indirect effects of disruption  
62 to health services and worsening socioeconomic conditions.[3] Conditions considered to increase the  
63 risk of infection include overcrowded and poorly serviced slum dwellings; limited access to basic  
64 handwashing facilities; high levels of informal employment limiting ability to work from home; high  
65 levels of malnutrition and lower ratios of beds and health workers to the population.[3] A commentary  
66 published by Agyeman et al. (2020) at the outset of the pandemic highlighted a rapid response within  
67 many African settings, including focus on early introduction of screening procedures at ports of entry,  
68 need for effective community engagement to educate about the mode of transmission. Key protective  
69 behaviours were emphasised, along with the need to prepare intensive care beds and clear government  
70 strategies regarding how to deal with hospitalised COVID-19 patients to avoid disrupting the health  
71 system and to prevent non-COVID-19 related deaths.[4] Subsequent studies have revealed that indirect  
72 health impacts from COVID-19 disproportionately impact women and children.[5,6] Diversion of  
73 resources (financial, material, human) from existing health services to address the pandemic, impacts  
74 their care.[5,6] This includes supply and demand side disruptions that can result in lower utilization  
75 of health care and, in some cases, impact on quality of care.[7] Bayani et al (2021) surmise that “less



1  
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3 76 health care will result in more ill health and deaths because health services have been suspended,  
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5 77 displaced, or inaccessible.”(page 5 [7])  
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8 78 Our study was carried out immediately following the first wave of COVID-19 in Liberia and UK (interviews  
9  
10 79 carried out June to September 2020) in response to an expressed need by stakeholders for this research  
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12 80 following dialogue in both contexts. The study was conducted within these two contexts (Merseyside  
13  
14 81 region and Liberia) based on strong prior research relationships within both settings. The differing  
15  
16 82 perspectives from national and county respondents speaking on the national response in Liberia, and  
17  
18 83 frontline health workers and decision makers up to regional level in Merseyside based on their personal  
19  
20 84 experiences and more localised regional response is a key limitation. We chose these settings due to  
21  
22 85 the opportunity and demand for research, not because they are exemplars of COVID-19 response. There  
23  
24 86 is, however, still opportunity for learning and comparison on both the strengths and weaknesses within  
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26 87 the COVID-19 initial response in both settings. The pandemic has continued to evolve across both  
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28 88 settings, with both Liberia and UK experiencing much larger waves of COVID-19 since this original study  
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30 89 was carried out. These findings from the first wave can provide valuable lessons to inform continued  
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32 90 response to COVID-19 and other health systems shocks.  
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38 91 The pandemic has revealed monopolies of knowledge production, which disempower lower and middle-  
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40 92 income countries;[8] whilst pandemic responses in ‘developed democracies’ have been inadequate,  
41  
42 93 with cuts to health and social services and limited commitment to equity or governance.[8] So-called  
43  
44 94 “global powerhouses with tried and tested health systems have struggled to contain the COVID-19  
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46 95 pandemic”[9] and health systems have been stretched to the limit, resulting in negative implications for  
47  
48 96 the health of all populations, particularly when access for patients with other acute and chronic illness  
49  
50 97 is limited.[8] As of 01/09/21, UK (population 66.8 million)[10] has 6,821,356 confirmed cases and  
51  
52 98 132,859 COVID-19 related deaths.[11] In the UK, the National Health Service delivers care for most of  
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54 99 the population. Meanwhile during the same time period, Liberia (population 4.9 million)[10] has had  
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56 100 5594 confirmed cases, with 245 confirmed COVID-19 related deaths.[11] There are marked differences  
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3 101 between settings in the roll-out and scope of testing capacity and uptake of this, with under-reporting  
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5 102 in many lower middle income countries, and so these figures cannot be assumed to be accurate. Future  
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7 103 comparisons will eventually show the magnitude of all-cause mortality by age, and firm conclusions  
8  
9 104 can be made about the success of different country approaches. Liberia was, initially hailed as one of  
10  
11 105 the top countries in fighting COVID-19, being one of the first countries to start screening at ports of entry  
12  
13 106 (January 2020) and to adopt other control measures such as rapid testing, contact tracing and  
14  
15 107 quarantine.[12,13]

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19 108 “Improving resilience within health systems can build on pre-existing strengths to enhance the  
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21 109 readiness of health system actors to respond to crises, while also maintaining core functions.”(page 1  
22  
23 110 [1]). People-centred health systems are a critical framing in shaping resilience as they place people  
24  
25 111 and communities at the centre whilst also promoting strategic and collaborative multi-sectoral  
26  
27 112 leadership which is necessary in delivering a co-ordinated response to a public health crisis.[14] In this  
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29 113 paper, we compare health systems responses at a single point in time (June to September 2020) within  
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31 114 Monrovia, Liberia and Merseyside, UK to distil lessons for health systems resilience to a pandemic  
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33 115 through comparative case studies which explore aspects of health systems resilience.[15] Within this  
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35 116 paper we combine the Foreign, Commonwealth and Development Office (FCDO) eight key principles  
36  
37 117 for promoting resilient health systems with key domains and values of people-centred health systems  
38  
39 118 to frame our findings in relation to the COVID-19 response.[16] Through our discussion we reflect on  
40  
41 119 these expanded principles for resilience against our conceptual framework (figure 1), which is based  
42  
43 120 on a people-centred approach. In response to calls for on-the-ground analysis of the response to  
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45 121 COVID-19 within the Global South and comparative case studies that use co-creation and coproduction  
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47 122 approaches which go beyond researchers including policy makers, practitioners and the public,[15,17]  
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49 123 we seek to share learning from the response within Liberia and the UK, along with opportunities for  
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51 124 multi-directional knowledge sharing.[17] It is our hope that this paper will help inform health policy  
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53 125 makers across global contexts, for the current pandemic response and as they plan towards more  
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55 126 resilient people-centred health systems to meet future shocks.  
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## 127 **Methods**

### 128 Study context

129 Liberia and UK have had very different strategies and case rates from the outset of the pandemic,  
130 although there were some similarities in the adoption of infection prevention control measures across  
131 both contexts. Liberia is amongst the world's poorest in terms of GDP and living conditions. According  
132 to the World Bank 2016 poverty headcount ratio, 44.4% of Liberians live below the international  
133 poverty benchmark of \$1.90 USD per day.[18] The UNDP Human Development Report 2020 ranks  
134 Liberia low at 175 out of 189 countries and territories.[19] Inequities between females and males are  
135 remarkable with literacy rates (secondary education) of 18.5% and 40.1% respectively.[19] Liberia has  
136 prior experiences of shocks in the form of two civil wars, and the 2014-2015 Ebola Virus Disease (EVD)  
137 epidemic.[20] In response to these experiences, Liberia has prioritised rebuilding a resilient health  
138 system, which acknowledges the critical role communities play in addressing their own health needs  
139 through the 'Investment Plan for Building a Resilient Health System in Liberia' and the community health  
140 services policy (2016-2021).[21,22] By contrast, Merseyside is a Metropolitan County in the North West  
141 of England, comprising five boroughs, including the City of Liverpool, including some of the most  
142 deprived council areas in England.[23] It has a population of 1.42 million and has had some of the highest  
143 numbers of COVID-19 cases in the UK.[24] Within Merseyside, the Liverpool City Region Combined  
144 Authority has prioritised tackling deprivation and reducing health inequalities through people-centred  
145 care, with integration of health and social care services.[25] Liverpool has a long history of public health  
146 innovation, but also a strong sense of local history, culture and place. Throughout the pandemic  
147 Liverpool has been at the forefront of community-based innovations and public health strategies, e.g.  
148 piloting community open access testing for COVID-19.[26]

149 Liberia introduced stringent border control measures from January 2020, with the establishment of a  
150 Special Presidential Advisory Committee on Coronavirus (SPACOC) over two months prior to the first  
151 recorded cases in the country.[27],[28] Liberia's response to COVID-19, prioritised a call to maintain

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3 152 the delivery of routine health services at all levels. Hospitals and clinics continued to provide health  
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5 153 services with health facility workers trained in infection prevention control (IPC) before the first case  
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7 154 was identified in country.[28] Physical distancing measures were introduced and use of face masks  
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9 155 encouraged.[29]

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13 156 Within the UK, health service delivery was restructured as part of the COVID-19 response, with routine  
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15 157 non-urgent elective care suspended and later re-started in April 2020.[30] Adaptations to minimise  
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17 158 potential risk of COVID-19 infection include the use of telemedicine and phone consultations; and  
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19 159 changes to essential services for patients, such as changed treatment plans and delays to surgeries.[31]  
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21 160 Hospital patient pathways were altered to appropriately triage and cohort the care of COVID-19 patients,  
22  
23 161 reducing the risk of transmission to others and allowing essential services to continue. There was also  
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25 162 reduction in routine blood test screening to prioritize COVID-19 PCR testing in response to the UKs  
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27 163 'test and trace' strategy.

#### 30 31 164 Study aim, design and conceptual framework

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34 165 Aim: To understand COVID-19 adaptations and decision-making in Liberia and Merseyside, UK

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37 166 This qualitative study explored inductively the differing experiences, perspectives and  
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39 167 recommendations of participants in order to understand COVID-19 adaptations and decision-making  
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41 168 in Liberia and Merseyside, UK.[32,33] We selected qualitative methods to give “due emphasis to the  
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43 169 meanings, experiences, and views of all the participants”(page 43 [32]) and understand decision-  
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45 170 making and the impact of health systems adaptations as a result of COVID-19.

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49 171 A conceptual framework was jointly developed, following a series of meetings held with researchers  
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51 172 in each setting (7 Liberia-based researchers and 18 UK-based researchers). This framework sought to  
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53 173 consider a people-centred approach towards the health system’s ability to respond to shock, whilst  
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55 174 reflecting the realities experienced in the face of multiple routine challenges (Figure 1).[34] The  
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57 175 nature of a shock to the health system, whether due to infectious disease outbreak, natural disaster,  
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3 176 or conflict, influences the rest of the framework.[35] It adopts a people-centred approach at its  
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5 177 heart,[14,36,37] while incorporating literature relating to the health system's ability to respond to a  
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7 178 sudden shock, and the extent to which it is able to absorb, adapt and transform in response (Figure  
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9 179 1).[35,38–42]

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12 180 People-centred health systems prioritise the collective right to health through integrated and targeted  
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14 181 approaches that favour the needs of the most vulnerable.[14,43] Collective action and social solidarity  
15  
16 182 are viewed as essential to the art and science of the development of people centred systems that are  
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18 183 organised around people's health care needs and expectations as opposed to diseases, ensuring a  
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20 184 continuum of care throughout the life course.[14] This approach embraces the human character of  
21  
22 185 health systems, by viewing individuals, communities and health workers as co-producers of health  
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24 186 care, placing people and families at the centre.[44] Systems must adapt to meet a range of challenges  
25  
26 187 to support the development of strategies that seek to improve health care access and encourage  
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28 188 universal coverage. This is particularly important as many individuals transition and oscillate between  
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30 189 multiple roles of patient, family and sometimes health care provider within one system.

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33 190 Interview topic guides were informed by the framework and developed across both settings to explore  
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35 191 key areas of health systems functioning in response to COVID-19 (Appendix 1). Questions included:  
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37 192 governance and decision-making; use of ethical guidelines; human resource management,  
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39 193 infrastructure (information technology and communications) and health care worker support;  
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41 194 introduction of innovations; and perceptions of the equity and quality of service delivery. Adaptations  
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43 195 were made according to the health systems context in each country, for example in Liberia, additional  
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45 196 questions were included to explore how learning from the EVD epidemic and other health systems  
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47 197 shocks informed COVID-19 response planning.

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50 198 Figure 1 placed here

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53 199 Study participants and data collection

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3 200 The study was carried out at different levels of the health system across both settings (Table 1). In  
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5 201 Liberia, we conducted key informant interviews in June and July 2020 with 21 national level and three  
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7 202 county level decision-makers (Nimba, Margibi and Montserrado Counties) purposively selected  
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9 203 because of their involvement with COVID-19 planning and/or routine service delivery. Some had also  
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11 204 played key roles in the EVD epidemic response. In Merseyside we conducted 42 key informant  
12  
13 205 interviews between July to September 2020, with regional, hospital and primary care decision-makers  
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15 206 (general practitioners and residential care home manager) and front-line workers selected because of  
16  
17 207 their involvement with COVID-19 planning and/ or the delivery of COVID-19 or routine services (see  
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19 208 Table 1). More interviews were carried out within the UK across health systems levels, due to demand  
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21 209 for research across multiple levels and the presence of a larger team of researchers. In Liberia, by  
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23 210 contrast the demand for research was focused at national level, and the research team was smaller in  
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25 211 size. The national and county level actors in Liberia, spoke about Liberia's response as a country. In  
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27 212 contrast study participants in Merseyside from across health systems levels, including frontline health  
28  
29 213 workers, spoke of their own direct experience within a particular hospital or setting, or on behalf of  
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31 214 Merseyside City Region. We acknowledge the limitation that including national and county level  
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33 215 actors only within Liberia, creates a somewhat limited perspective. It would have been preferable to  
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35 216 have included a larger number and range of participants from sub-national health systems levels to  
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37 217 provide more depth of understanding about the COVID-19 response.  
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44 *Table 1 Study participants' role*

Participant Role	Number of Participants Interviewed
<b>Merseyside, UK</b>	
Regional decision-maker	5
Hospital decision-maker (Clinical director, medical director, ward manager)	4
Hospital consultant	11
Hospital health worker (junior doctors, nurses)	10
Health worker in community (GP, district nurse, residential care home)	7
Liverpool Clinical Laboratory staff	5
<b>Total</b>	<b>42</b>

<b>Liberia participants</b>	
National decision-maker	21
County decision-maker	3
<b>Total</b>	<b>24</b>

219

220 Interviews were predominantly carried out remotely by researchers experienced in qualitative  
 221 interviewing in English language, via online platforms such as Microsoft Teams or Skype. A minority  
 222 were carried out in person with physical distancing measures in place, according to local guidance at  
 223 the time. All interviews were audio-recorded. Data collection stopped when no new themes emerged  
 224 from additional data collected.[45] Interviews lasted approximately 30 to 60 minutes. Audio  
 225 recordings were transcribed verbatim, with quality assurance conducted by a second researcher  
 226 against the recording.

### 227 Data Analysis

228 The study has sought to use a pragmatic approach to research, working through existing networks to  
 229 carry out timely research to support the ongoing COVID-19 response in both settings. Both inductive  
 230 and deductive approaches were blended within data analysis, in keeping with other health systems  
 231 research [46–49]. In both Liberia and UK, preliminary data analysis workshops were held separately  
 232 with the research team members involved with data collection. Prior to the workshops all participants  
 233 reviewed transcripts to familiarise and immerse themselves within the data in order to inductively  
 234 identify emerging themes which arose from within the study findings. Through these separate country  
 235 workshops key themes were identified and used to generate a separate coding framework for each  
 236 setting. All transcripts were imported into NVivo Version 12 qualitative data analysis software for  
 237 coding (QSR International Pty Ltd. Version 12, 2018). Following review of the initial themes which  
 238 emerged inductively from within the data, there was found to be strong alignment with the eight  
 239 FCDO principles. These principles were then deductively applied to assist with mapping the findings  
 240 and enabling comparison between settings. The research team did not simply accept the eight FCDO  
 241 principles, rather the team reviewed them and found that they did not fully cover all the aspects of

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3 242 resilience which emerged from the data. As a result two further principles were identified and applied  
4  
5 243 to adequately compare findings between both settings, relating to “mechanisms for advance  
6  
7 244 preparation” (Principle 9) and “adaptable governance and leadership structures” (Principle 10). The  
8  
9 245 application of the expanded FCDO principles for resilience has helped to showcase how Liberia’s  
10  
11 246 experience with responding to prior shocks and their learned need for early advance preparedness  
12  
13 247 provided an important element working towards resilience. This study is not funded by FCDO, nor  
14  
15 248 were FCDO involved in any way as researchers or co-authors within the research team.  
16  
17  
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19 249 Detailed findings and recommendations were developed into two policy briefs in accordance with  
20  
21 250 these expanded principles for resilience and were shared and discussed with relevant stakeholders  
22  
23 251 from both study settings.[29,50] The relationship of the findings to the original conceptual  
24  
25 252 framework was reviewed and findings compared between settings during a final on-line workshop,  
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27 253 attended by all those involved with data collection in both settings, with key similarities and  
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29 254 differences jointly discussed.  
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### 33 Ethics

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36 256 Ethical approval was received from the Liverpool School of Tropical Medicine Research Ethics  
37  
38 257 Committee (Protocol ID 20-045); the University of Liverpool Ethics Committee (Reference 7811) and  
39  
40 258 the University of Liberia-Pacific Institute for Research and Evaluation Institutional Review Board;  
41  
42 259 National Health Service Health Research Authority and Health and Care Research, Research Ethics  
43  
44 260 Committee (Reference 20/HRA/2597); Integrated Research Application System (Project ID 284143).  
45  
46 261 All study participants were provided with a participation information leaflet at least 48 hours prior to  
47  
48 262 interview. All participants provided written, or audio recorded consent to participate.  
49  
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51

### 52 Patient and public involvement

53  
54  
55 264 Neither patients nor the general public were involved in the design, conduct, reporting or  
56  
57 265 dissemination of our research.  
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60



266 **Results**

267 We present findings according to the expanded FCDO principles for resilience (Box 1) (key illustrative  
 268 quotes are summarised for each principle in table 2). We then reflect on the findings in light of people-  
 269 centred health systems within the discussion.

*Box 1 Expanded Principles of Health Systems Resilience in the Context of COVID-19 Response*

**Principle 1** Develop flexible pathways for medical supplies  
**Principle 2** Prioritise a list of essential health services [*and continued provision of quality and equitable routine services*]  
**Principle 3** Build trust with local communities  
**Principle 4** Foster good communication at all system levels  
**Principle 5** Support, recognise and encourage staff  
**Principle 6** Facilitate rapid resource flow and greater flexibility in its use  
**Principle 7** Ensure agile tracking of health information  
**Principle 8** Cultivate effective partnerships and networks  
**Principle 9** Structures and mechanisms for advanced preparedness (**New principle**)  
**Principle 10** Adapt governance and leadership structures to facilitate timely decision-making and effective coordination of response (**New principle**)

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271 *Table 2 Illustrative quotations from Liberia and Merseyside related to each FCDO Principle*

Principle	Comparison	Quotations
<b>Principle 1: Develop flexible pathways for medical supplies</b>	Supply chains disturbed across settings due to global shortages and price inflation. Lack of buffer stock in both settings. Restructuring of supply chains in Liberia led to disturbance for routine supplies.	<p>“Supply chain are affected greatly because their concentration is on how to provide the COVID response activities meaning the ...medicines and medical supplies that are needed [for] NTDs (Neglected Tropical Diseases), lack of attention will now be paid to that.” (LIB national decision maker 029)</p> <p>“With regards to PPE, there was national guidance about what we should do and there was a huge amount of fear amongst nurses and medics and everyone else understandably. Everyone was scared. I was scared. If someone said they weren’t scared, then they’re lying or they’re a fool. The national guidance was confused, and availability of PPE fluctuated. Procurement here [NHS hospital] did a very good job, but sometimes it just wasn’t delivered nationally. And we went through other supply chains...” (LIV hospital decision maker, Merseyside UK 014)</p>
<b>Principle 2: Prioritise a list of essential health services [and continued provision of quality and equitable routine services]</b>	Discontinuation of elective non-urgent care in UK, contrasts with early emphasis on continued routine care in Liberia.	<p>“So we just have to be robust and do the necessary investment into routine health services, preventive in terms of creating awareness and education among health workers about covid and how we can continue to care for our patients, with fighting the infection at the same time.” (LIB national decision maker 001)</p>

Principle	Comparison	Quotations
		<p><i>"There's the whole big risk around the screening program...the screening program was stopped, restarting that it's gonna be really challenging. And I suppose that's another risk in terms of people with delayed diagnosis and the right treatment, as a result of not having had that screening mammograms." (LIV hospital decision maker Merseyside UK 051)</i></p>
<p><b>Principle 3: Build trust with local communities</b></p>	<p>Both settings experiences reduced service utilisation due to loss in community trust. Introduction of innovative follow-up visits to patients led to increased service use in Liberia.</p>	<p><i>"Some of the useful things that we have been using from Ebola time is, as I said before, to involve the communities ...The community aspect is very important because it will help us for the COVID-19 where communities, family members, all of those at the community level are influential group they will be able to comply like we did in the Ebola." (LIB national decision maker 005)</i></p> <p><i>"The elderly population have been shielding because of comorbidities and all that. I think they probably not being as vocal about things that they're concerned about because they're worried about that they will be asked to come in. They fear that that they will catch Covid when they come here." (LIV hospital health worker Merseyside UK 048)</i></p>
<p><b>Principle 4: Foster good communication at all system levels</b></p>	<p>Expansion of virtual communication in both settings. In Merseyside frequently changing guidance from multiple sources created confusion.</p>	<p><i>"One of the things that quickly used to come to me is to be able to adapt to working with social media technology and all of that, because that's the first thing if you have to communicate with people in this manner you need to understand zooming, skyping, how to take notes.." (LIB national decision maker 029)</i></p> <p><i>"And there's so many different sources of information that say different things from what people hear within the hospital talking to friends on the corridor, that you've got to come out with a consistent message. And I think it took longer than was ideal to get a central source of information...But people need to be told what the situation is rather than try to be falsely reassured sometimes as well." (LIV hospital decision maker, Merseyside UK 004)</i></p>
<p><b>Principle 5: Support, recognise and encourage staff</b></p>	<p>Health worker redeployment was common across settings. Health worker training varied in UK according to cadre.</p>	<p><i>"Like take for example, when COVID came some of our workers from the [name] Hospital was recruited to go at the front line and [hospital name] is for routine services so taking employees from there to go at the front line that tells you it kind of understaff... So routine services kind of slow down and every attention was placed on COVID but going forward, with the system in place, routine services have gotten back on its feet." (LIB national decision maker 010)</i></p> <p><i>"And it felt like there was unequal share of knowledge and also an unequal kind of confidence in protective clothing. ... And I think the people that spent the most time with the patient, the patient</i></p>

Principle	Comparison	Quotations
		<i>areas, for instance, the health care assistants and the cleaning staff didn't have all of the information [at the] beginning or any PPE training.” (LIV hospital health worker Merseyside UK 017)</i>
<b>Principle 6: Facilitate rapid resource flow and greater flexibility in it's use</b>	Prior under-investment in health was common across settings. In Merseyside there was increased funding available and removal of bottlenecks, which enabled swifter action.	<i>“The first thing is, we need ownership by government, ownership is not depending on other countries to provide us the resources, to provide the technical capacity. So that is the best recommendation I would say. The ownership has to be there, resources have to be available and the infrastructure has to be available in terms of being resilient.” (LIB national decision maker 029)</i> <i>“To be honest, it was a fairly novel experience because it was a situation where if we asked we more or less got [funding].” (LIV hospital decision maker, Merseyside UK 004)</i>
<b>Principle 7: Ensure agile tracking of health information</b>	Data quality reduced in Liberia. In Merseyside increased data was collected, but inadequate data analysis measures were put in place.	<i>“Another recommendation is that we could include COVID-19 to our regular disease surveillance. Like we have the measles, the Lassa, and thing. I think we should include COVID because COVID maybe all around. Like we included Ebola, there should be a document on COVID-19 that will form part of our regular surveillance.” (LIB county decision maker 024)</i> <i>“...there's some value in looking at the things that we were looking at before COVID, because at least we have some longitudinal data on that so that we can see what the effect of COVID is.” (LIV hospital health worker, Merseyside UK 020)</i>
<b>Principle 8: Cultivate effective partnerships and networks</b>	Liberia was able to call upon prior decision-making structures (established during Ebola response) to enable swift decisions. Need for stronger engagement between primary and secondary care in Merseyside.	<i>“Involvement of multi-sectorial stakeholders in the response; that was one major thing that we learned from Ebola. And that has been brought to be on this response, so there has been a spark from the level of the presidency where they have key ministries and agency heads heading pillars on the COVID-19 response, involving the community people.” (LIB national decision maker 028)</i> <i>“I think one thing, it's really highlighted is the divide between hospital and primary care. We didn't work together very well before the epidemic, and we are still not working together very well. And I think if things were to get better, the whole health system needs to work better.” (LIV community-level health worker, Merseyside UK 033)</i>
<b>Principle 9: Structures and mechanisms for advanced preparedness</b>	Learning from Ebola prompted rapid preparedness in Liberia, in contrast to Merseyside.	<i>“If you don't prepare well and you are caught unaware you will have a lot of issues, so we didn't wait for COVID to enter Liberia before we prepositioned basic PPE and those are all part of the preparedness phase.” (LIB county decision maker 026)</i> <i>““It was blatantly obvious that anything we've ever planned for in relation to a pandemic or anything along those lines was not the plans that we needed... So I think going forward there needs to be almost a better planning system in place...it's not</i>

Principle	Comparison	Quotations
		<i>just a matter of just saying any pandemic it's about what kind of pandemic." (LIV hospital decision maker, Merseyside UK 069)</i>
<b>Principle 10: Adapt governance and leadership structures to facilitate timely decision making and effective coordination of response</b>	Need for rapid guidance from national level to enable sub-national decision making was common in both settings.	<i>"So, at this point in time we think if you give the resources, put the money in the hands of the county health team to buy what they need, that will be more effective ... So, we want decision should be given back to the people on the frontline so that they make the decision rather than a centralized point in Monrovia where people sit and decide for people in the lower level and the people choices made the right kind of thing they might need at that level." (LIB national decision maker 028)</i> <i>"... we were having to work, to a large extent, in the dark. The amount of guidance that came through nationally and even regionally, was actually relatively limited at that stage and we were having to do what felt like quite a lot of planning in isolation." (LIV decision maker Merseyside UK 008)</i>

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273 Principle 1 Develop flexible pathways for medical supplies: Across both settings supply chains were  
 274 disturbed due to global shortages and price inflation. In Merseyside there was a lack of personal  
 275 protective equipment (PPE) and laboratory reagents needed for COVID-19 testing. Meanwhile, in  
 276 Liberia, the disturbances related to routine supplies as supply chains shifted to focus on COVID-19  
 277 related procurement. In both settings, these challenges were felt to relate to global shortages, but  
 278 were worsened by failure to maintain buffer stocks at local and national levels. In both settings,  
 279 participants expressed the need for greater decentralisation of procurement decisions.

280 Principle 2 Prioritise a list of essential health services [and continued provision of quality and equitable  
 281 routine services]: Participants from Merseyside expressed fears that there was too much emphasis on  
 282 COVID-19 care, at times creating redundant capacity, while limiting access and quality of routine  
 283 essential services. The blanket discontinuation of all elective non-urgent care at the height of the first  
 284 wave in Merseyside, UK was felt to be unhelpful, and a more nuanced approach which seeks to  
 285 balance long-term as well as short term risks associated with health conditions was recommended. In  
 286 contrast, Liberia's early emphasis on routine health services was described as a key learning prioritised  
 287 by decision-making platforms following the country's experience with the EVD epidemic.

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3 288 COVID-19 adaptations in the UK led to increased telemedicine, with some respondents raising access-  
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5 289 related equity concerns, particularly for elderly populations, who may struggle to engage with  
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7 290 telemedicine. There were also concerns raised about quality of care, with some participants in  
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9 291 Merseyside fearing delayed-diagnosis, misdiagnosis or sub-optimal care due to restrictions limiting  
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11 292 physical contact with patients. In Liberia, limited opportunities for supervision, diversion of funds and  
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13 293 staff for routine services towards COVID-19 response, and limited community outreach activities (due  
14  
15 294 to physical distancing) were felt to impact quality of care. Across both settings innovations in service  
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17 295 delivery have emerged (see policy briefs for details).[29,50]  
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22 296 Principle 3 Build trust with local communities: In both settings, community trust to seek health  
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24 297 services declined, which reduced utilisation of services. In Liberia, fear among the population during  
25  
26 298 the start of the pandemic led to reduction in the uptake of health services including national routine  
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28 299 vaccination programmes and health facility-based delivery. This was felt to relate to a combination of  
29  
30 300 fear of contracting COVID-19 at facilities and to reduced community outreach activities. Innovative  
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32 301 community engagement and social mobilization strategies were introduced, for example follow-up  
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34 302 visits to pregnant women, which led to patients returning to use services after a few months. Another  
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36 303 example is the selective outreach home visits by the Neglected Tropical Disease (NTD) programme to  
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38 304 NTD affected patients, in order to avoid interruption in treatment provision. In Merseyside, utilisation  
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40 305 of non-COVID related services remained suppressed for much longer. This was deemed to relate to  
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42 306 widespread community mistrust, and Government campaigns which initially discouraged the public  
43  
44 307 from visiting health facilities via the national 'Stay at home' messaging. Applying learning from  
45  
46 308 Liberia's experience with EVD, the Government of Liberia placed a strong emphasis on working  
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48 309 alongside community governance structures, involving local authorities as part of COVID-19 response.  
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53 310 Principle 4 Foster good communication at all system levels: The need for effective communication  
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55 311 within the health system appeared to be a significant theme, particularly within findings from  
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57 312 Merseyside. The rapidly changing context during the early months of the pandemic created a wealth  
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3 313 of daily new information. Virtual forms of communication rapidly expanded in both settings, with  
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5 314 WhatsApp and online meeting platforms used extensively. Within Merseyside, referred to challenges  
6  
7 315 such as multiple sources of guidance and communication channels struggling to keep pace with the  
8  
9 316 changing guidance, which at times created contradictory messaging and confusion among health  
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11 317 workers. By contrast, Liberia developed a centralised messaging procedure with approval needed  
12  
13 318 from the department of Health Promotion before dissemination. In Merseyside, use of emails were  
14  
15 319 typically less popular with staff as these could often be too long and wordy. Participants expressed  
16  
17 320 limited scope for frontline staff to feedback on the information that had been shared.  
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22 321 Principle 5 Support, recognise and encourage staff: Staff redeployment was common across both  
23  
24 322 settings, contributing to varied workloads. In Liberia, health worker redeployment to COVID-19  
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26 323 treatment centres, alongside largely unchanged utilisation rates contributed to increased workload  
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28 324 for remaining health workers responsible for provision of routine services. By contrast in Merseyside,  
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30 325 redeployment resulted in over-staffing in certain COVID-19 wards. Although there was disparity  
31  
32 326 between health workers, with nurses experiencing increased workload. Due to the reduced volume  
33  
34 327 of patients seeking routine care in the UK, workload was variable for those providing these services.  
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36 328 The degree to which health workers received training about COVID-19 prior to having to manage  
37  
38 329 COVID-19 patients varied between settings, with Liberia carrying out training in identification,  
39  
40 330 isolation and infection, prevention and control before the first case of COVID-19 arrived in country, as  
41  
42 331 a result of lessons learned following experiences responding to EVD. By contrast in Merseyside, the  
43  
44 332 roll out of training varied widely by cadre, with some participants identifying that health care  
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46 333 assistants and cleaning staff did not receive PPE training until later in the pandemic, compared with  
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48 334 doctors and nurses (see table 2).  
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53 335 Anticipated mental health implications for health workers emerged from the Merseyside data, due to  
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55 336 high rates of COVID-19 infection, exhaustion and high future anticipated post-traumatic stress  
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57 337 disorder (PTSD). This was associated with fear of making treatment mistakes, stress surrounding  
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3 338 patient escalation decision making, anxiety over potential COVID-19 infection (both personal and for  
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5 339 family), trauma surrounding high COVID-19 infections and deaths and reduced psychosocial support  
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7 340 due to remote working. Measures to support staff wellbeing were introduced (including counselling,  
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9 341 reflective therapy, peer support and mentoring, information made available about local support  
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11 342 services), with varied levels of uptake. This was not widely discussed in Liberia. Although measures  
12  
13 343 in Liberia to support staff wellbeing include psychosocial teams, roaming mental health counsellors  
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15 344 providing services to health workers are in place. In Merseyside, community support, strong solidarity  
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17 345 and teamwork were considered enablers of staff resilience.

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21 346 Principle 6 Facilitate rapid resource flow and greater flexibility in its use: Historic underfunding of the  
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23 347 health system in both settings has been highlighted by the pandemic. In Merseyside, this was  
24  
25 348 considered to be due to nearly a decade of austerity, which has created weariness and uncertainty;  
26  
27 349 whereas in Liberia it related to perception of reliance on external donors which predated the  
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29 350 pandemic. Our findings confirmed the need for adequate funding to ensure the building blocks of the  
30  
31 351 health system have received investment prior to the onset of any shock. With the arrival of the  
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33 352 pandemic the availability and flexibility of funding differed between settings. In Merseyside, UK there  
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35 353 was increased central government funding, which was mostly freed of usual bureaucratic checks.  
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37 354 Managers noted that the removal of these bottlenecks allowed for swift action and rapid adoption of  
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39 355 innovations. Frontline managers' ability to make operational decisions was viewed as central to  
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41 356 resilience. In Liberia, however, there was an identified need for greater Government of Liberia  
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43 357 ownership. Some sectors of the health system, particularly those which are donor reliant struggled in  
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45 358 response to reduced partner support following the pandemic. Initially funding was not made  
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47 359 available, however funds for routine service delivery were re-allocated to COVID-19 response, with  
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49 360 implications for quality (see principle 2). Participants complained about excessive bureaucracy  
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51 361 associated with use of funds, which created delays.  
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3 362 Principle 7 Ensure agile tracking of health information: Health information systems (HIS) were rapidly  
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5 363 developed in the UK to collect huge quantities of surveillance data on COVID-19 and essential services.  
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7 364 However, there was need for improved skills to usefully interpret this data. Respondents in Liberia  
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9 365 stated that regular and timely submission of data, particularly from the community level had declined  
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11 366 since the onset of COVID-19. This was considered to relate to reduced data validation, with decreased  
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13 367 supervision visits due to physical distancing. In Merseyside complex new systems were designed to  
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15 368 collect pandemic surveillance data, however, data was frequently not analysed or made readily  
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17 369 accessible to staff to influence timely monitoring and quality improvement in services. In Merseyside,  
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19 370 respondents also noted that a number of new initiatives were introduced during the pandemic, such  
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21 371 as virtual consultations, but have not yet been systematically evaluated.  
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26 372 Principle 8 Cultivate effective partnerships and networks: The need for well-established partnerships  
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28 373 emerged in both settings, with Liberia already having clear multi-sectoral participation in decision-  
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30 374 making following the Incident Management System developed following EVD. Merseyside data  
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32 375 highlighted pre-existing weaknesses in collaboration between primary and secondary/ tertiary care  
33  
34 376 have been exacerbated. In both settings the need for greater engagement with the private sector  
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36 377 was affirmed, with respondents from UK highlighting the need for stronger links regarding PPE supply  
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38 378 chain shortages and in Liberia the need to strengthen collaboration given perceived weakness in  
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40 379 private facility IPC standards. Partnerships were established within Merseyside, in a range of aspects  
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42 380 of service delivery, including: regional network of laboratory providers to address equipment  
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44 381 challenges and ensure COVID testing; between GPs to create service hubs; between disciplines and  
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46 382 departments within hospital to address staff shortages and share information. In Liberia, a reduction  
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48 383 in the number of partners providing response support was noted. This was a marked contrast to the  
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50 384 EVD response.  
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56 385 Principle 9 Structures and mechanisms for advanced preparedness (newly identified principle from  
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58 386 our findings): Within Liberia in particular, but also in Merseyside, there was discussion about  
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3 387 advanced preparedness. Respondents in Liberia emphasised how their experiences with previous  
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5 388 shocks, particularly EVD, had facilitated learning around early recognition of the need for  
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7 389 preparedness. For instance, there was consensus among respondents that waiting for COVID-19 to  
8  
9 390 reach Liberia before responding would be too late. There was early rapid mobilisation of existing  
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11 391 emergency response systems which had been established during the EVD response including; health  
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13 392 check controls and quarantines at border points from January 2020; health worker COVID-19 training  
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15 393 before the first confirmed case; enhanced hygiene practices; restriction of physical contact and  
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17 394 sustained use of PPE, building on institutional memory gained through the EVD epidemic. In contrast,  
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19 395 respondents in Merseyside expressed that the COVID-19 response was impeded by a lack of pandemic  
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21 396 preparedness for new emerging infectious diseases.

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26 397 Principle 10 Adapt governance and leadership structures to facilitate timely decision-making and  
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28 398 effective coordination of response (newly identified principle from our findings): Being able to adapt  
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30 399 governance and leadership structures to facilitate timely response coordination emerged from both  
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32 400 settings. Liberia had previously established the incident management system (IMS) in 2014 as part of  
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34 401 the response to EVD. It was re-activated in March 2020 to guide planning their pandemic response,  
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36 402 led by the Minister of Health. This multi-sectoral team included a range of political and public health  
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38 403 decision-makers, donors and partner representatives. At the time the study was carried out, most  
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40 404 decisions were made centrally, with implementation at county level. In Merseyside, early response  
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42 405 was hindered by slow and centralised guidance and decision-making, which was perceived to be  
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44 406 oriented towards achieving political goals, rather than providing much needed clarity and recognition  
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46 407 of local reality. The limited scope for local autonomy was considered to strain relationships between  
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48 408 local senior leadership who sought to enforce central directives, and frontline staff, who wanted scope  
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50 409 to influence them. In both settings, there was interest in greater de-centralisation of decision-making  
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52 410 to lower levels.

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58 411 **Discussion**  
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3 412 Our findings demonstrate the commonalities between the principles for resilience and people-centred  
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5 413 health systems (Figure 2). We believe that maintaining a people-centred approach can help ensure  
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7 414 that COVID-19 related adaptations are acceptable, understood and meet the needs of individuals  
8  
9 415 (both patients and health workers). The values which underpin people-centred health systems  
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11 416 emphasise the need for equity, orienting health services towards a health system which puts “people  
12  
13 417 and communities at their centre, and surrounds them with responsive services that are coordinated  
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15 418 both within and beyond the health sector, irrespectively of country setting and development  
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17 419 status.”(page 9 [14])  
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#### 22 420 **Adapting a people-centred framework**

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24 421 All ten FCDO principles (eight original principles and two principles identified through this study) are  
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26 422 mapped against the original conceptual framework, to demonstrate the connection between our  
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28 423 findings and existing literature about resilience (Figure 2) and recommendations in response to each  
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30 424 principle are outlined in box 2.  
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34 425 Figure 2 placed here  
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427 **Capacity and knowledge exchange**

428 The continuation of routine essential service delivery following a shock to the health system, has  
 429 previously been highlighted as an area of concern across a range of sectors.[51,52] Health systems

*Box 2 Recommendations from expanded FCDO principles for resilience*

1. Supply chains should pre-position adequate stocks, diversify sources and seek decentralisation of procurement. Collaboration between providers can prove valuable in securing continuity of supplies.
2. Routine services should be prioritised with a view to long term as well as short term impact, with prioritisation re-evaluated regularly as the pandemic progresses.
3. Maintain consistent communication and engagement with community leaders as partners to participate in pandemic planning within their respective communities.
4. Keep communication channels open, with regular updates for staff which highlight the key information, preferably through meetings, rather than email.
5. Ensure adequate provision of training, with sufficient PPE for health staff particularly for those staff at highest risk of COVID-19 infection, alongside measures to balance workload and promote staff wellbeing. Prioritise compassionate leadership which is supportive of staffing levels and rotas, along with staff mental wellbeing. Investment in psychosocial wellbeing throughout and after the pandemic response.
6. Health systems need to be adequately funded during 'normal times' if they are to be able to respond when a shock arises. There is urgent need for investment to clear the backlog of delayed routine services.
7. Health information systems need greater investment in both the systems and the human element to be able to analyse, interpret and respond to emerging data trends.
8. Opportunities for multisectoral collaboration should be sought out, with engagement with private sector where possible.
9. Develop a proactive approach, with advance plans for health shocks, along with escalation and de-escalation plans throughout the crisis.
10. Promote greater opportunities for de-centralised staff involvement in decision-making where feasible. Governments to prioritise an outward focus towards global solidarity.

430 need the capacity to continue to deliver services of good quality alongside responding to wider health  
 431 challenges.[42] Our findings for principle 2 highlighted that COVID-19 adaptations in the UK led to the  
 432 cancelling or postponing of many essential services, including those related to cancer care, which has  
 433 been anticipated to decrease life expectancy and survival.[52,53] Meanwhile, Liberia emphasised the  
 434 need for continuation of routine services and the promotion of patient confidence to use these  
 435 services. This is in contrast to the EVD epidemic, where over 80% reductions in maternal delivery care

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3 436 in EVD affected areas were described and form part of the reason why routine care was prioritised so  
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5 437 strongly as part of the COVID-19 response.[54]  
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8 438 Our findings relating to supply chain (principle 1) resonate with literature from previous shocks and  
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10 439 research emerging from the COVID-19 pandemic.[55,56] We found the need for greater flexibility,  
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12 440 with engagement with a more diverse range of suppliers and greater decentralised control over supply  
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14 441 chain across both settings. This is in keeping with a recent systematic review of supply chain resilience  
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16 442 literature, which identified the importance of diversity and the social aspects of supply chains during  
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18 443 a pandemic response.[55] Supplying commodities without investing in health systems strengthening  
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20 444 will not produce a robust supply chain, limiting ability to respond quickly and effectively to future  
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22 445 demands.[55]  
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27 446 We found a strong focus on the need for support for the health workforce, particularly in UK (principle  
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29 447 5). This was not as widely discussed in Liberia (though this may be a limitation relating to differing  
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31 448 levels of participants between countries). However, a previous study in Sierra Leone and Liberia,  
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33 449 highlighted that many providers may carry unresolved trauma from earlier shocks (including the Ebola  
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35 450 epidemic), which may have implications for them during the COVID-19 response.[57,58] Research  
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37 451 among health workers treating patients with COVID-19 in China, revealed health workers had a higher  
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39 452 prevalence of insomnia, anxiety, depression, somatisation and obsessive-compulsive symptoms  
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41 453 compared with nonmedical health workers, indicating the need for support and recovery programs  
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43 454 for these staff.[59] Stressors identified among workers in China, include many of those described by  
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45 455 participants in both settings within our study, particularly within Merseyside, including difficulties  
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47 456 feeling safe at work, lack of infection prevention and control (IPC) measures and COVID-19 knowledge,  
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49 457 long term workload, high risk of exposure to COVID-19, shortage of PPE and lack of rest, among  
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51 458 others.[59]  
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57 459 Our findings regarding resource flow to frontline providers (Principle 6), are in keeping with previous  
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59 460 study which identified funding as a core dimension within a health systems' ability to adapt and  
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3 461 respond to shocks.[60] A recent systematic review found aggregate public spending for health is  
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5 462 associated with improved life expectancy, reduced child and infant mortality and more equitable  
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7 463 health outcomes.[56]  
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#### 10 464 **Relational and teamwork components**

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13 465 The relational components which exist are shaped by risk, trust, values, power, norms, and  
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15 466 culture.[42] These components play a role in determining the success (or failure) in response to a  
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17 467 health systems shock or crisis. In contrast to the FCDO recommendation for good communication  
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19 468 between actors (principle 4), our findings highlight challenges, particularly in the UK, where  
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21 469 communication channels struggled to keep pace with changing guidance creating contradictory  
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23 470 messaging and confusion among health workers. This is in keeping with previous study which found  
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25 471 differences in lines of authority and acceptability of communication pathways can contribute to  
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27 472 problems in communication.[34] In response, key principles were identified including participation  
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29 473 for all, respect, information sharing, collaboration and problem-solving.[34]  
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34 474 The need for strong governance structures and leadership which adapts to the response (principle 10),  
35  
36 475 was identified as a gap within early response in Merseyside. This was felt to have been hindered by  
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38 476 slow and centralised guidance and decision-making with a perceived limited scope for autonomy  
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40 477 within decision-making at lower levels. Within Liberia learning from the EVD response, and  
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42 478 establishing an incident management system (IMS) (led by the Minister of Health) and Special  
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44 479 Presidential Advisory Committee on Coronavirus (SPACC) (led by the President) early in planning their  
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46 480 pandemic response enabled timely decision-making.[27] In both settings, there was interest in greater  
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48 481 de-centralisation of decision-making to lower levels. Blanchet et al (2017) emphasised the need for  
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50 482 legitimacy within resilience, with requirement of capacity to develop socially and contextually  
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52 483 accepted institutions and norms.[40]  
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57 484 Looking more broadly, the conceptual framework highlights community engagement, with the  
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59 485 community being active participants of any health systems response (principle 3).[39] Our findings  
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3 486 emphasise the value of community engagement within the response within Liberia, based on lessons  
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5 487 from the EVD pandemic and in keeping with WHO recommendation that this be a key pillar within  
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7 488 COVID-19 country response.[8] Liberians across all socio-demographic groups responding to a recent  
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9 489 survey said they were very well, or somewhat well informed about the COVID-19 pandemic, with only  
10  
11 490 5% feeling not very well/ not at all informed.[27] This also emerged as a key finding in Singapore, with  
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13 491 engagement through new and social media channels monitored, with clarification of misinformation  
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15 492 by MOH.[61] In contrast to the findings from Liberia, participants from Merseyside highlighted the  
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17 493 need for stronger communication (although there were some examples of creative ways to engage  
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19 494 with diverse communities).

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24 495 Learning from our study has emphasised the need to better prepare for, and respond to, health  
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26 496 emergency crises through integrated services (Principle 9).[44] A recent survey found most of the  
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28 497 population felt the Liberian government was doing well in managing the pandemic.[44] This  
29  
30 498 contrasted with findings from the UK where there was felt to have been a lack of adequate advance  
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32 499 planning and preparation. Two previous literature reviews highlighted that “preparedness depends  
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34 500 on health systems ability to learn from prior pandemics”, with responses often reactive rather than  
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36 501 proactive.[56,62]

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40 502 The people-centred approach stresses the need for awareness and recognition of the  
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42 503 interdependencies of the health system with the community and other social systems, including  
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44 504 education, social protection and food security and their relationship with social determinants of health  
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46 505 (principle 8).[63] Our findings emphasise the need for strong partnerships with other sectors across  
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48 506 settings, in keeping with an identified success in Singapore’s response,[61] and is a key aspect of  
49  
50 507 Blanchet et al.’s resilience framework, ensuring the capacity to engage with and handle multiple actors  
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52 508 and dynamics.[40]

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56 509 Our findings, particularly from Merseyside emphasise the vast quantities of data being generated  
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58 510 through the COVID-19 response, but there are gaps in how this data is analysed and utilised within the  
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3 511 health system. The importance of adequate HIS is in keeping with previous studies.[40,60] A health  
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5 512 system's ability to identify and respond to an emerging threat is needed if it is to appropriately meet  
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7 513 emerging needs during a rapidly evolving health crisis or shock (principle 7).[40,41] A robust health  
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9 514 management information system (HMIS) is crucial to a health systems capacity to respond to  
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11 515 shock.[60] Health systems need to have the ability to combine and integrate different forms of  
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13 516 knowledge and to anticipate and cope with uncertainties and unplanned events.[40]  
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17 517 COVID-19 has reflected and exacerbated existing social inequalities and emphasised the importance  
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19 518 of global collective action, rather than an individual response for genuine resilience. [8] Vaccine  
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21 519 inequity and a lack of global solidarity on the part of some richer countries, are dominating the current  
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23 520 phase of the pandemic. Our findings seek to highlight opportunity for shared learning across settings  
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25 521 in the Global South and North, emphasising the need for a global response to this and future shocks.  
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## 29 522 **Strengths and Limitations**

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32 523 The strengths of this study include the quality of data analysis, which involved a wide range of  
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34 524 researchers across both settings, and the breadth of perspectives captured from frontline staff and  
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36 525 key decision-makers early in the course of the pandemic. Our study had a number of limitations.  
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38 526 Within Merseyside, study participants were selected from across a range of health system levels  
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40 527 including primary care, hospital frontline workers and decision-makers as well as regional decision-  
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42 528 makers. By contrast, in Liberia participants included national and county level decision-makers,  
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44 529 technicians and supervisors of frontline staff, with no direct frontline workers included. This may  
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46 530 result in some of the differences in findings, related to these differing perspectives. Perhaps the  
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48 531 greatest limitation of this study is that it was carried out at a single point in time. In Merseyside we  
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50 532 collected data towards the end of the first wave, at a time when there were few inpatients and people  
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52 533 were reflecting on the first wave. Meanwhile in Liberia it was carried out before there had been a  
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54 534 large increase in cases. Since the study was carried out there have been subsequent even greater  
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56 535 waves of cases within Merseyside, UK and Liberia has experienced a large surge in cases of the delta  
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3 536 variant (59% of cases recorded in Liberia up until 17<sup>th</sup> July 2021, occurred during a six week period  
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5 537 from June 1 2021 to 17<sup>th</sup> July 2021).[64] By the weeks beginning July 24<sup>th</sup> to August 7<sup>th</sup> 2021 number  
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7 538 of confirmed cases had declined between zero to 43. Response measures have evolved in both  
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9 539 settings, and limitations identified through the study may have been addressed in subsequent stages  
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11  
12 540 of the pandemic.

## 15 541 **Conclusion**

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18 542 We found the ability of health systems to be able to absorb, adapt and transform in response to the  
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20 543 COVID-19 pandemic in two very different settings closely relates to the eight FCDO principles of  
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22 544 resilience.[16,40] We expanded these principles to include strong structures and mechanisms for  
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24 545 advance preparation, and adaptable governance and leadership structures to facilitate timely  
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26 546 decision-making and response coordination. At the heart of our findings lies the centrality of the  
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28 547 people-centred health system, where the person, is placed within their family, community and the  
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30 548 health system.[14] When all aspects work together the outcome is the extent of resilience  
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32 549 demonstrated within a health system in response to shock.[40] This includes both the provision of  
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34 550 specific services in response to the shock experienced, as well as continued provision of and demand  
35  
36 551 for 'routine care'. Our study highlights the need to maintain a people-centred approach for a resilient  
37  
38 552 health system response.

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8 563 **Competing Interests**  
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10  
11 564 None declared.  
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14 565 **Author Statement**  
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16  
17 566 RM prepared the first draft of the paper with inputs from all; Study design, conceptualisation, ethics  
18  
19 567 (ST, LD, MT, LF, IB, ZZ, RM, VW, HP, RAdC, RH, KK); conducted interviews in UK – RM, VW, MT, KO, HP,  
20  
21 568 SC, ST, TEH, RH, RD, YD, OH; conducted interviews in Liberia - ZZ, WT, HB, JK, JSS, CP, GZ, RM. All  
22  
23 569 interviewers participated in the cross-country analysis which was led by YA in the UK with inputs from  
24  
25 570 those who conducted UK interviews and LD, RM, ZZ, HB, WT, JK, JSS, GZ, CP in Liberia. All authors were  
26  
27 571 involved in critical review of the approach, inputted into and approved the final draft of the  
28  
29 572 manuscript.  
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33 573 Figure 1 caption: Conceptual framework  
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36 574 Figure 2: Expanded principles for resilience and people-centred health systems framework  
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50 580 (NIHR2001129) and FCDO COUNTDOWN (PO6407) programme.  
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54 581 **Data availability**  
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57 582 Data are available upon reasonable request.  
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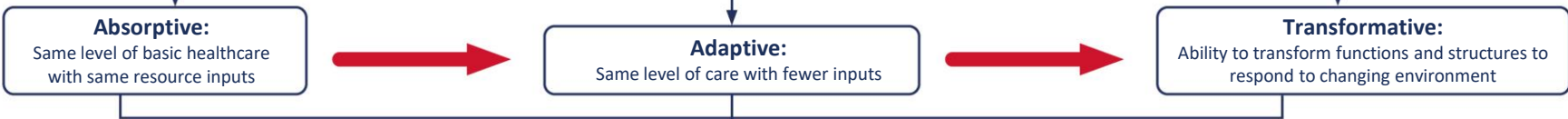
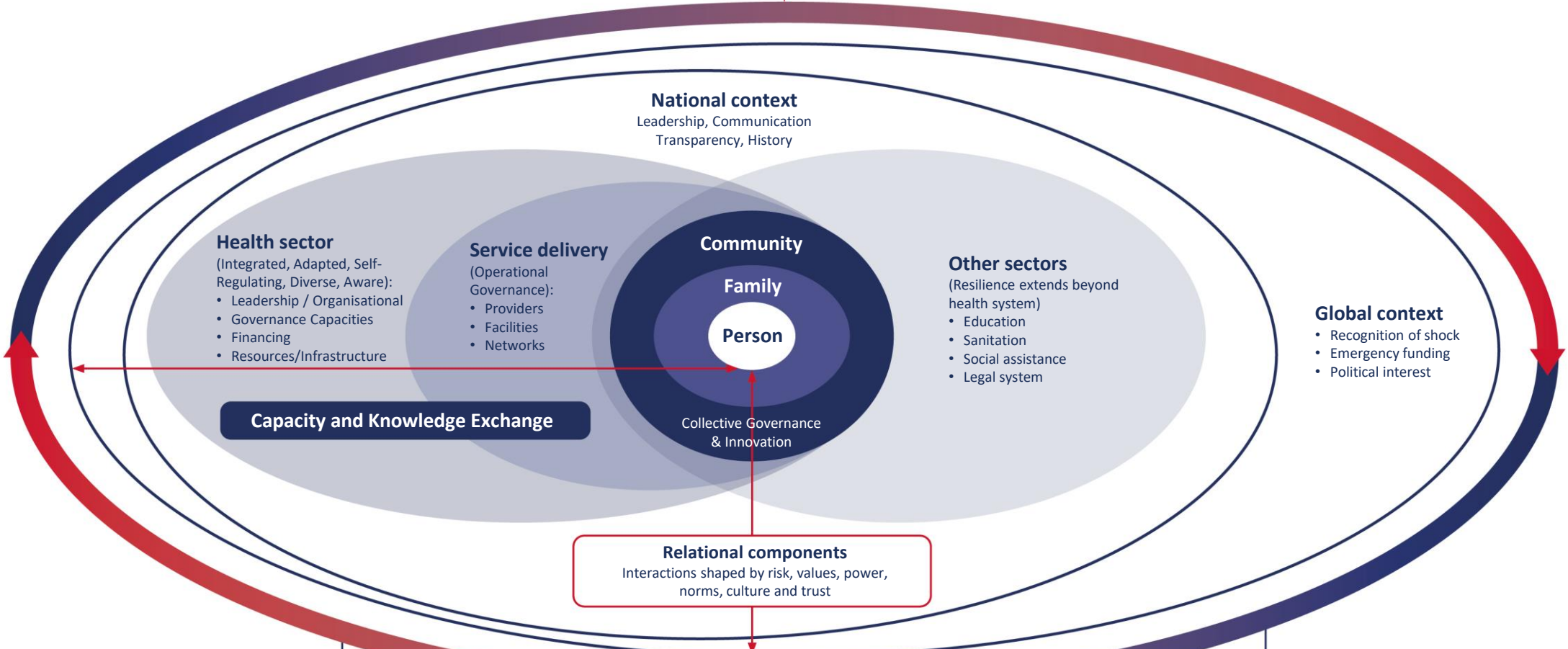
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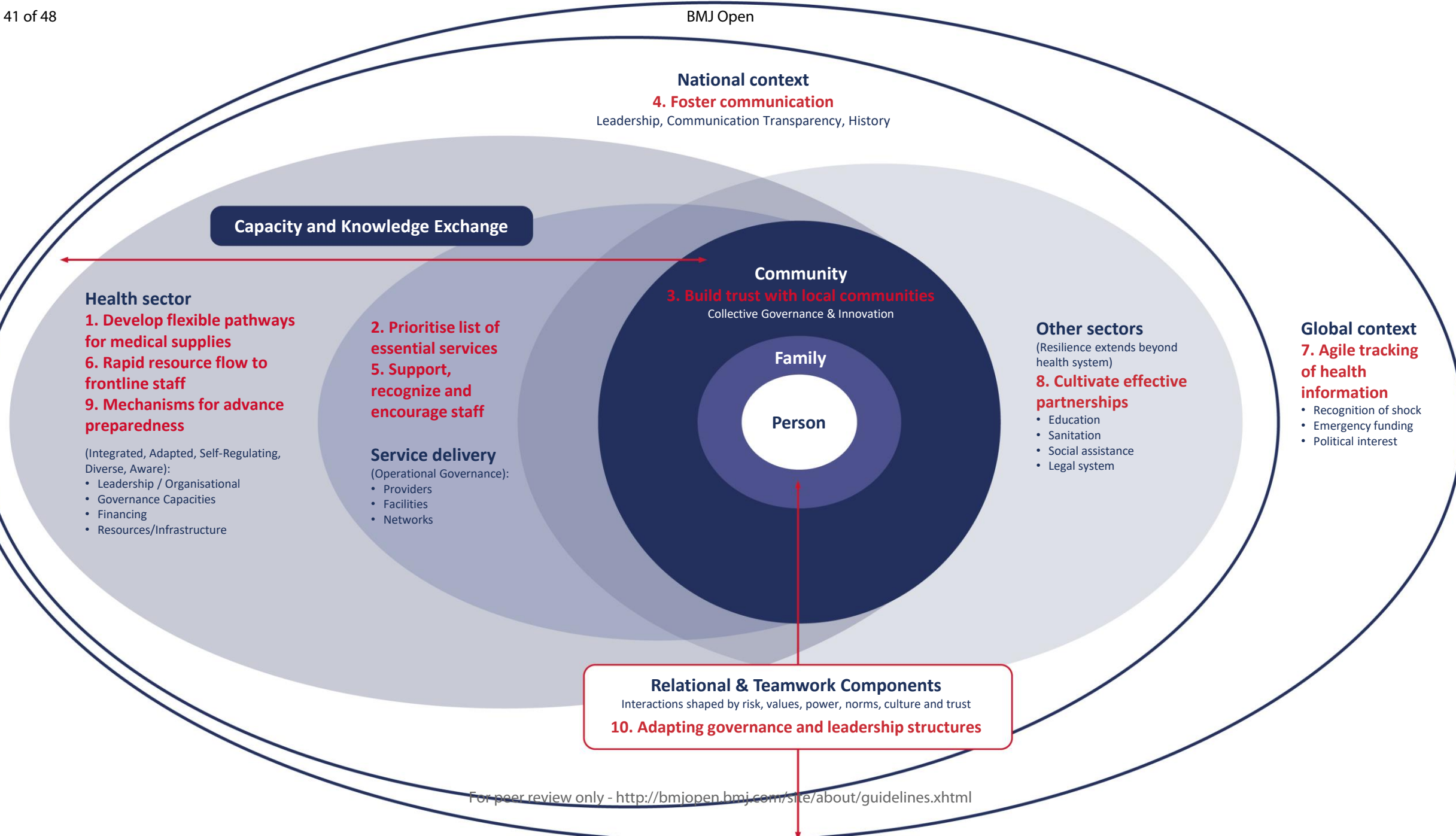
**NATURE OF THE SHOCK - CONFLICT, TERRORIST ATTACK, INFECTIOUS DISEASE OUTBREAK, NATURAL DISASTER, FINANCIAL, MIGRATION, CLIMATE CHANGE, CHRONIC CHALLENGES, OTHER**



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**Resilience**

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Appendix 1: COVID-19 Key Informant Interview Topic Guides

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## Key Informant Interviews Topic Guide –MOH Liberia

All possible questions to be asked of key informants are described in the following guide. Prior to interviewing each stakeholder, specific guides for these individuals will be made. One interview that covers relevant research themes will be completed with each stakeholder. Ordering of questions will also be revised to ensure logical flow through the interview and to avoid repetition.

### Background

Please can you tell me your position and how long you have worked in your current role?

How has your role changed due to the current COVID-19 crisis?

### Responses to Shock and the General Health System

1. How do you think the health system has coped with the COVID-19 crisis? How did it compare with previous crisis? How have routine services been impacted?
2. How is the current shock (COVID-19) the health system is experiencing similar or different to those you have experienced before?
3. What are the key learnings from previous shocks (Ebola/ conflict/ economic crisis)? How are they being used to respond now?
4. How do you think routine health systems functions are being impacted by the current crisis (COVID19/economic)?
5. What do you think could be done to support continuation of routine services? How is this informed or shaped by learnings from during the Ebola period?
  - a. How would you describe the quality of services usually? How is quality of care being maintained throughout the COVID-19 response?
6. What policy or guidelines are supporting with the current COVID response? What additional guidelines or policies could be helpful for the COVID response?

### Service Specific Impacts

**Questions in this section to be reviewed/modified for cross-cutting MOH functions, e.g. M&E, research division prior to starting interview**

7. Can you tell me about how service delivery within your programme/section (adapt to include name of section depending on who talking too) has been affected by the COVID pandemic?
  - a. Which of your services would you say have been most impacted so far? Why?
  - b. Which services would you envisage will be most impacted moving forwards? Why?
8. How have your routine services been modified or adapted? Which components of your service do you view as essential? Why?
9. Which specific sub-populations is routine care most impacted for? Are there any marginalised groups who may struggle to use services since the onset of the COVID-19 crisis? (Probe: e.g gender, dis/ability, rural/urban; wealth; geographic regions; age etc)
10. Have there been any innovations within service delivery in response to the COVID-19 crisis, and have they been useful in any way?
11. Has there been any innovations in response to COVID-19 that have concerned you?

### Human Resource Management

12. How have you planned for staffing to meet the changing additional workload in response to COVID? Any tools/ guidance from the human resource section? Successes and challenges? (Prompt for role of new community health cadres, for those providing face to face care and for MOH staff)
13. What additional skill development have you provided and how in response to COVID? Successes and challenges?
14. How are you able to support staff so they can continue to work effectively during the COVID pandemic
  - a. How have you supported staff through communication?
  - b. How have you supported staff for occupational safety including PPE?

COVID-19 Key Informant Interview Topic Guides

- c. How have you supported staff through with psychosocial support?
- d. What have been the successes and challenges with supporting staff?

### Service and System Impacts: Governance and Decision Making

**Questions in this section to be reviewed/modified to make these questions more service-specific, depending on the interviewee's programme area**

15. How are decisions made about which services should or should not be prioritised as part of the COVID response? (prompt for in relation to their specific service and also in relation to general health system, prompt for donor influence)
16. How does decision-making as part of the COVID response influence routine planning activities? What has been the impact of resource re-distribution as part of the COVID response?
17. Who is involved in this decision making and what are the processes? What are the challenges?
18. What do you think are the key ethical impacts of making these decisions? What ethical guidelines are currently in place and important in decision making during this period?
19. What guidance documents are available to support you in making decisions regarding COVID?
20. What guidance documents would help to support maintaining routine services?

### Closing Questions

21. What does a resilient health system look like to you? What are your three recommendations would you make to improve or maintain the resilience of the Liberian health system during this period?
22. What are your three recommendations would you make post crisis to ensure the return to routine function of the health system as effectively as possible?

Additional questions for Director of personnel only

23. What are the main sources of additional staffing (e.g. secondment/redeployment, task-shifting, improved productivity, early graduation/students, returnees, volunteers)? Successes and challenges? Optional: Impact on the wage bill?
24. What areas of service are now struggling with staffing?
25. What are you able to do to retain staff? Successes and challenges?
26. What impact did/is down-sizing of "non-essential staff" have on your programme during the crisis?

Thank-you

Any other comments?



## Key Informant Interviews Topic Guide –Merseyside Regional Decision Makers

### Version 1.1\_01052020

All possible questions to be asked of key informants are described in the following guide. Prior to interviewing each stakeholder, specific guides for these individuals will be made. One interview that covers relevant research themes will be completed with each stakeholder. Ordering of questions will also be revised to ensure logical flow through the interview and to avoid repetition.

### Question List

#### Background

Please can you tell me your position and how long you have worked in your current role?

#### Impact of COVID 19 on Routine Service Delivery

1. What are defined as essential routine services?
2. Which are the main scheduled and unscheduled services affected by COVID-19 and how have these been adapted over time?
3. Have there been any innovations within service delivery, and what have these been?
4. Have there been any changes that have concerned you? Why?
5. What would help to support maintaining routine services?

#### Governance and Decision Making

6. What has informed your decision-making, such as guidance documents or governance decision-making processes?
7. Who is involved in decisions made about which services should or should not be prioritised?
8. How are decisions made about which services should or should not be prioritised?
9. Describe how and who is involved in operationalising decisions?
10. What challenges have you faced in making these decisions?
11. What are the main differences between various sites in the trust, especially between Aintree and the Royal Hospitals?
12. How are changes in service delivery communicated? How can this be improved? There are multiple guidelines at national and local levels, how are these disseminated? How well does this work? How rapidly? How do health care workers respond to these changes?

#### Human Resource Management

13. How have you [may be the employer in general] planned for staffing to meet the changing additional workload? Any tools/ guidance from national authorities? Successes and challenges?
14. How have you planned for the increase in staff absence?
15. What additional skill development have you provided and how? What have been the successes and challenges?
16. How are you able to support staff so they can continue to work effectively (e.g. communication, occupational safety including PPE, psychosocial support)? What have been the successes and challenges?

#### Recovery post COVID-19

17. Are there any COVID-19-related changes to routine health services that you think it would be useful to continue after COVID-19? Which ones and why?
18. What next steps do you believe should be taken now to support the health system to recover post COVID-19?

## COVID-19 Key Informant Interview Topic Guides

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3 Thank-you

4 Do you have any further suggestions for improvements to delivery of routine services?

5 Any other comments?  
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3 Key Informant Interviews Topic Guide – Health Workers  
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6 **Version 1.1\_01052020**

7 All possible questions to be asked of key informants are described in the following guide. Prior to interviewing  
8 each stakeholder, specific guides for these individuals will be made. One interview that covers relevant  
9 research themes will be completed with each stakeholder. Ordering of questions will also be revised to ensure  
10 logical flow through the interview and to avoid repetition.  
11

12 **Question List**

13 **Background**

14 Please can you tell me your usual position and how long you have worked in that role?

15 Are you currently working in your usual role and department?

16 If no, what role and department are you now working in?  
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20 **Impact of COVID 19 on Routine Essential Service Delivery**

- 21 1. Can you tell me about how health service delivery has been affected by the COVID pandemic? What was  
22 the processes for this, how was it communicated and do you have any ideas about how this can be  
23 improved? How prepared did you feel for these?
- 24 2. What do you consider to be routine essential health services in your work?
- 25 3. Which are the main scheduled and unscheduled services affected by COVID-19 in your department and  
26 how have these been adapted over time?
- 27 4. What have been the strengths and challenges with these changes? How has quality been affected?
- 28 5. How should these changes be evaluated? What indicators should be used?
- 29 6. What is worrying you most about your service now?
- 30 7. Which services would you envisage will be most impacted moving forwards as the pandemic  
31 progresses? (e.g. hospital based, community care, disease specific services, etc) Why?
- 32 8. Who do you think are the people most impacted by the changes in routine service delivery? Would you  
33 say that patients with specific socio-demographic characteristics are more impacted by service disruption/  
34 distortion than others? Why? (e.g. gender, dis/ability; rural/urban; wealth; geographic regions; age  
35 etc) What can be done to ensure that these patients can still use health services when they need them?  
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40 **Ethics and Decision Making**

- 41 9. Have you encountered any health systems issues which you found troubling since the start of the COVID-  
42 19 pandemic? Would you be willing to tell me more about these issues?
- 43 10. What is the impact of these issues on you as a health worker? What would be helpful to support you in  
44 dealing with these issues?
- 45 11. Do you know of any ethical guidelines in place to guide you as you make difficult decisions during this  
46 time? What are these? How are these ethical guidelines operationalised? Are they useful?
- 47 12. Have you been involved with making decisions about the changes to health services since the COVID-19  
48 pandemic? What was your role in making these decisions? How were these decisions made?
- 49 13. When there are changes in how health services are delivered how are these communicated with you?  
50 How has this worked? What do you think is the best way to be informed?  
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54 **Human Resource Management**

- 55 14. How has your role changed since the start of the COVID-19 pandemic? What have been the successes and  
56 challenges with how your role has changed? Probe workload
- 57 15. Is there anything about your role that concerns you? What?  
58 a. Probe working outside area of expertise  
59 b. No indemnity if make an error  
60 c. Communication about working across disciplines

COVID-19 Key Informant Interview Topic Guides

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3 16. What preparation for the changes to your role have you had and how was it delivered (skills - key ones,  
4 psychological support)? What have been the successes and challenges?  
5 a. Probe PPE training  
6 b. COVID clinical training  
7 c. Support mechanisms  
8 d. Team formation  
9  
10 17. What kind of support (e.g. communication, occupational safety including PPE, psychosocial support) are  
11 you receiving to do your job from your team/manager/employer? What have been the successes and  
12 challenges?

### 13 **Recovery post COVID-19**

- 14 18. Are there any COVID-19-related changes or innovations to routine health services that you think it would  
15 be useful to continue after COVID-19? Which ones and why?  
16 19. What next steps do you believe should be taken now to support the health system to recover post COVID-  
17 19?  
18 20. What is worrying you most as the response moves forward?

21 Thank-you

22 Do you have any further suggestions for improvements to delivery of routine services?

23 Any other comments?  
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## Key Informant Interviews Topic Guide –Merseyside Laboratory and Blood Transfusion Staff

### Version 1.1\_01052020

All possible questions to be asked of key informants are described in the following guide. Prior to interviewing each stakeholder, specific guides for these individuals will be made. One interview that covers relevant research themes will be completed with each stakeholder. Ordering of questions will also be revised to ensure logical flow through the interview and to avoid repetition.

### Background

Please can you tell me your position and how long you have worked in your current role?

### Governance and Decision Making - Relating Directly to COVID-19

1. What has been the decision-making process for the laboratory's response to COVID-19 testing services and when did discussions start around re-adjusting services for COVID-19?
2. Who held overall responsibility for how COVID-19 testing was going to be conducted at LCL?
3. In addition to PHE, have the Liverpool Clinical Laboratory services worked closely/ collaborated with any other external partners for COVID-19 testing? If so whom and in what capacity?

### Governance and Decision Making - Relating to Maintaining Routine Service Delivery

4. How are decisions made about which services should or should not be prioritised; which ones were considered to be essential and why? Who is involved in this decision making? How were these decisions communicated?
5. What guidance documents were most useful to you in making these decisions? In what way were they useful?
6. What key challenges have you faced in making these decisions? Do you have any support needs here?

### Impact of COVID-19 on Routine Laboratory Service Delivery

7. Can you tell me about how routine clinical laboratory service delivery has been affected by the COVID pandemic?  
COVID-19 Testing service specific
8. How did the laboratories adapt to scale up COVID-19 testing? (analysers, staff capacity, staff training, standard operating procedures, risk assessments)
9. What challenges did the laboratory face when implementing COVID-19 testing? How were they overcome? What worked well? (e.g. resources, human resource, process change, governance, culture, leadership etc)
10. Which routine services would you envisage will be most impacted moving forwards? (e.g. hospital based-testing, disease specific services, etc) Why?

### Recovery post COVID-19

11. Are there any COVID-19-related changes to the laboratory service that you think it would be useful to continue after COVID-19? Which ones and why?
12. What next steps do you believe should be taken now to support the laboratory system to recover post COVID-19?
13. Are there any changes/ innovations introduced in response to COVID-19 changes which you think should be continued? Why?

Thank you

Do you have any questions for me? Resources (re labs) link <https://www.rcpath.org/uploads/assets/90111431-8aca-4614-b06633d07e2a3dd9/Guidance-and-SOP-COVID-19-Testing-NHS-Laboratories.pdf>

COVID-19 Key Informant Interview Topic Guides

Table 1 Standards for Reporting Qualitative Research (SRQR)

<b>Standard</b>	<b>Page number</b>
S1 Title	P1, line 1-2
S2 Abstract	P2, line 12-35
S3 Problem formulation	P3 line 53-75
S4 Purpose of research question	P4, line 78-124
S5 Qualitative approach and research paradigm	P11 line 229-232
S6 Research characteristics and reflexivity	P8 line 165-190
S7 Context	P7 line 129-164
S8 Sampling strategy	P10 line 200-212
S9 Ethical issues pertaining to human subjects	P11 line 255-262
S10 Data collection methods	P8 line 167-171
S11 Data collection instruments and technologies	P9 line 191-198
S12 Units of study	P10 line 219-224
S13 Data processing	P11 line 224-226
S14 Data analysis	P11 line 232-249
S15 Techniques to enhance trustworthiness	P 11 line 226-227
S16 Synthesis and interpretation	P 13 line 267-410
S17 Links to empirical data	P13 line 267-272
S18 Integration with prior work, implications, transferability, and contributions to the field	P21 line 411-523
S19 Limitations	P27 line 524-542
S20 Conflicts of interest	P28 line 565-566
S21 Funding	P28 line 558-562

# BMJ Open

## Qualitative study exploring lessons from Liberia and the UK for building a people-centred resilient health systems response to COVID-19

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1 **Title Qualitative study exploring lessons from Liberia and the UK for building a people-centred**  
2 **resilient health systems response to COVID-19**

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## 12 **Abstract**

13 Introduction: COVID-19 has tested the resilience of health systems globally and exposed existing  
14 strengths and weaknesses. We sought to understand health systems COVID-19 adaptations and  
15 decision-making in Liberia and Merseyside, UK.

16 Methods: We used a people centred-approach to carry out qualitative interviews with 24 health  
17 decision-makers at National and County Level in Liberia and 42 actors at County and hospital level in the  
18 UK (Merseyside). We explored health systems' decision-making processes and capacity to adapt and  
19 continue essential service delivery in response to COVID-19 in both contexts.

20 Results: Study respondents in Liberia and Merseyside had similar experiences in responding to COVID-  
21 19, despite significant differences in health systems context, and there is an opportunity for multi-  
22 directional learning between the global south and north. The need for early preparedness; strong  
23 community engagement; clear communication within the health system, and health service delivery  
24 adaptations for essential health services emerged strongly in both settings. We found the Foreign,  
25 Commonwealth and Development Office (FCDO) principles to have value as a framework for reviewing  
26 health systems changes, across settings, in response to a shock such as a pandemic. In addition to the  
27 eight original principles, we expanded to include two additional principles; 1) the need for functional  
28 structures and mechanisms for preparation and 2) adaptable governance and leadership structures to  
29 facilitate timely decision-making and response coordination. We find the use of a people-centred  
30 approach also has value to prompt policy makers to consider the acceptance of service adaptations  
31 by patients and health workers, and to continue the provision of 'routine services' for individuals  
32 during health systems shocks.

33 Conclusion: Our study highlights the importance of a people-centred approach, placing the person at  
34 the centre of the health system, and value in applying and adapting the FCDO principles across diverse  
35 settings.

## 36 **Strengths and Limitations of the Study**

- 37 • A key strength of this study is the multi-directional learning between health systems in the global  
38 south and global north, which involved a wide range of researchers across both settings, and the  
39 breadth of perspectives captured from frontline staff and key decision-makers.
- 40 • The greatest limitation of this study is that it was carried out at a single point in time, towards the  
41 end of the first wave in the UK and before there had been a large increase in cases in Liberia.  
42 Response measures have evolved in both settings in subsequent stages of the pandemic.
- 43 • The study was limited by the differing range of respondents across study settings, with  
44 participants from across a range of health system levels including primary care, hospital frontline  
45 workers and decision-makers, as well as regional decision-makers within Merseyside, UK;  
46 compared with national and county level decision-makers, technicians and supervisors of frontline  
47 staff in Liberia, which may result in differing perspectives.

48

## 49 Introduction

50 The COVID-19 pandemic has forever altered our world. Its impact has been felt across all nations,  
51 demonstrating the importance of resilient health systems in protecting global health security.[1]

52 Health systems have been forced to adapt to new ways of working alongside the continued provision  
53 of essential services including: prevention of communicable diseases; sexual and reproductive health;  
54 care for vulnerable populations; ongoing management of chronic illness (including mental health  
55 conditions); continuity of critical inpatient therapies; management of emergency health conditions;  
56 and auxiliary services, including diagnostic imaging, laboratory and transfusion services.[2]

57 In April 2020, the United Nations expressed concern that, within Africa, up to 3.3 million people could  
58 lose their lives as a direct result of COVID-19 and many more through the indirect effects of disruption  
59 to health services and worsening socioeconomic conditions.[3] Conditions considered to increase the  
60 risk of infection include overcrowded and poorly serviced slum dwellings; limited access to basic  
61 handwashing facilities; high levels of informal employment limiting ability to work from home; high  
62 levels of malnutrition and lower ratios of beds and health workers to the population.[3] A commentary  
63 published by Agyeman et al. (2020) at the outset of the pandemic highlighted a rapid response within  
64 many African settings, including a focus on early introduction of screening procedures at ports of entry,  
65 and a need for effective community engagement to educate about the mode of transmission. Key  
66 protective behaviours were emphasised, along with the need to prepare intensive care beds, and clear  
67 government strategies regarding how to deal with hospitalised COVID-19 patients to avoid disrupting  
68 the health system and to prevent non-COVID-19 related deaths.[4] Subsequent studies have revealed  
69 that indirect health impacts from COVID-19 disproportionately impact women and children.[5,6]  
70 Diversion of resources (financial, material, human) from existing health services to address the  
71 pandemic, impacts their care.[5,6] This includes supply and demand-side disruptions that can result  
72 in lower utilization of healthcare and, in some cases, impact on quality of care.[7] Bayani et al (2021)

1  
2  
3 73 surmise that “less healthcare will result in more ill health and deaths because health services have  
4  
5 74 been suspended, displaced, or inaccessible.”(page 5 [7])  
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8 75 Our study was carried out immediately following the first wave of COVID-19 in Liberia and UK (interviews  
9  
10 76 carried out June to September 2020) in response to an expressed need by stakeholders for this research  
11  
12 77 following dialogue in both contexts. The study was conducted within these two contexts (Merseyside  
13  
14 78 region and Liberia) based on strong prior research relationships within both settings. The differing  
15  
16 79 perspectives from national and county respondents speaking on the national response in Liberia, and  
17  
18 80 frontline health workers and decision makers up to regional level in Merseyside, based on their personal  
19  
20 81 experiences and more localised regional response, is a key limitation. We chose these settings due to  
21  
22 82 the opportunity and demand for research, not because they are exemplars of COVID-19 response. There  
23  
24 83 is, however, still opportunity for learning and comparison on both the strengths and weaknesses within  
25  
26 84 the COVID-19 initial response in both settings. The pandemic has continued to evolve across both  
27  
28 85 settings, with both Liberia and UK experiencing much larger waves of COVID-19 since this original study  
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30 86 was carried out. These findings from the first wave can provide valuable lessons to inform continued  
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32 87 response to COVID-19 and other health systems shocks.  
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38 88 The pandemic has revealed monopolies of knowledge production, which disempower lower and middle-  
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40 89 income countries;[8] whilst pandemic responses in ‘developed democracies’ have been inadequate,  
41  
42 90 with cuts to health and social services and limited commitment to equity or governance.[8] So-called  
43  
44 91 “global powerhouses with tried and tested health systems have struggled to contain the COVID-19  
45  
46 92 pandemic”[9] and health systems have been stretched to the limit, resulting in negative implications for  
47  
48 93 the health of all populations, particularly when access for patients with other acute and chronic illness  
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50 94 is limited.[8] As of September 1<sup>st</sup> 2021, the UK (population 66.8 million)[10] has 6,821,356 confirmed  
51  
52 95 cases and 132,859 COVID-19 related deaths.[11] In the UK, the National Health Service delivers care  
53  
54 96 for most of the population. Meanwhile during the same time period, Liberia (population 4.9 million)[10]  
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56 97 has had 5594 confirmed cases, with 245 confirmed COVID-19 related deaths.[11] There are marked  
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3 98 differences between settings in the roll-out and scope of testing capacity and uptake of this, with under-  
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5 99 reporting in many lower middle income countries, and so these figures cannot be assumed to be  
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8 100 accurate. Future comparisons will eventually show the magnitude of all-cause mortality by age, and  
9  
10 101 firm conclusions can be made about the success of different country approaches. Liberia was initially  
11  
12 102 hailed as one of the top countries in fighting COVID-19, being one of the first countries to start screening  
13  
14 103 at ports of entry (January 2020) and to adopt other control measures such as rapid testing, contact  
15  
16 104 tracing and quarantine.[12,13]

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18  
19 105 Improving resilience within health systems can build on pre-existing strengths to enhance the  
20  
21 106 readiness of health system actors to respond to crises, while also maintaining core functions.[1]  
22  
23 107 People-centred health systems are a critical framing in shaping resilience as they place people and  
24  
25 108 communities at the centre, whilst also promoting strategic and collaborative multi-sectoral leadership  
26  
27 109 which is necessary in delivering a co-ordinated response to a public health crisis.[14] In this paper, we  
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29 110 compare health systems responses at a single point in time (June to September 2020) within Monrovia,  
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31 111 Liberia and Merseyside, UK, to distil lessons for health systems resilience to a pandemic through  
32  
33 112 comparative case studies which explore aspects of health systems resilience.[15] Within this paper we  
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35 113 combine the Foreign, Commonwealth and Development Office (FCDO) eight key principles for  
36  
37 114 promoting resilient health systems with key domains and values of people-centred health systems to  
38  
39 115 frame our findings in relation to the COVID-19 response.[16] Through our discussion we reflect on  
40  
41 116 these expanded principles for resilience against our conceptual framework (figure 1), which is based  
42  
43 117 on a people-centred approach. In response to calls for on-the-ground analysis of the response to  
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45 118 COVID-19 within the Global South and comparative case studies that use co-creation and co-production  
46  
47 119 approaches which go beyond researchers, including policy makers, practitioners and the public,[15,17]  
48  
49 120 we seek to share learning from the response within Liberia and the UK, along with opportunities for  
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51 121 multi-directional knowledge sharing.[17] It is our hope that this paper will help inform health policy  
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53 122 makers across global contexts, for the current pandemic response and as they plan towards more  
54  
55 123 resilient people-centred health systems to meet future shocks.

## 124 **Methods**

### 125 Study context

126 Liberia and UK have had very different strategies and case rates from the outset of the pandemic,  
127 although there were some similarities in the adoption of infection prevention control measures across  
128 both contexts. Liberia is amongst the world's poorest in terms of GDP and living conditions. According  
129 to the World Bank 2016 poverty headcount ratio, 44.4% of Liberians live below the international  
130 poverty benchmark of \$1.90 USD per day.[18] The UNDP Human Development Report 2020 ranks  
131 Liberia low at 175 out of 189 countries and territories.[19] Inequities between females and males are  
132 remarkable with literacy rates (secondary education) of 18.5% and 40.1% respectively.[19] Liberia has  
133 prior experiences of shocks in the form of two civil wars, and the 2014-2015 Ebola Virus Disease (EVD)  
134 epidemic.[20] In response to these experiences, Liberia has prioritised rebuilding a resilient health  
135 system, which acknowledges the critical role communities play in addressing their own health needs  
136 through the 'Investment Plan for Building a Resilient Health System in Liberia' and the community health  
137 services policy (2016-2021).[21,22] By contrast, Merseyside is a Metropolitan County in the North West  
138 of England, comprising five boroughs, including the City of Liverpool, including some of the most  
139 deprived council areas in England.[23] It has a population of 1.42 million and has had some of the highest  
140 numbers of COVID-19 cases in the UK.[24] Within Merseyside, the Liverpool City Region Combined  
141 Authority has prioritised tackling deprivation and reducing health inequalities through people-centred  
142 care, with integration of health and social care services.[25] Liverpool has a long history of public health  
143 innovation, but also a strong sense of local history, culture and place. Throughout the pandemic  
144 Liverpool has been at the forefront of community-based innovations and public health strategies, e.g.  
145 piloting community open access testing for COVID-19.[26]

146 Liberia introduced stringent border control measures from January 2020, with the establishment of a  
147 Special Presidential Advisory Committee on Coronavirus (SPACOC) over two months prior to the first  
148 recorded cases in the country.[27],[28] Liberia's response to COVID-19, prioritised a call to maintain

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3 149 the delivery of routine health services at all levels. Hospitals and clinics continued to provide health  
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5 150 services with health facility workers trained in infection prevention control (IPC) before the first case  
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7 151 was identified in country.[28] Physical distancing measures were introduced and use of face masks  
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9 152 encouraged.[29]

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13 153 Within the UK, health service delivery was restructured as part of the COVID-19 response, with routine  
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15 154 non-urgent elective care suspended and later re-started in April 2020.[30] Adaptations to minimise  
16  
17 155 potential risk of COVID-19 infection include the use of telemedicine and phone consultations; and  
18  
19 156 changes to essential services for patients, such as changed treatment plans and delays to surgeries.[31]  
20  
21 157 Hospital patient pathways were altered to appropriately triage and cohort the care of COVID-19 patients,  
22  
23 158 reducing the risk of transmission to others and allowing essential services to continue. There was also  
24  
25 159 reduction in routine blood test screening to prioritize COVID-19 PCR testing in response to the UKs  
26  
27 160 'test and trace' strategy.

### 161 Study aim, design and conceptual framework

162 Aim: To understand COVID-19 adaptations and decision-making in Liberia and Merseyside, UK

163 This qualitative study explored inductively the differing experiences, perspectives and  
164 recommendations of participants in order to understand COVID-19 adaptations and decision-making  
165 in Liberia and Merseyside, UK.[32,33] We selected qualitative methods to give “due emphasis to the  
166 meanings, experiences, and views of all the participants”(page 43 [32]) and understand decision-  
167 making and the impact of health systems adaptations as a result of COVID-19.

168 A conceptual framework was jointly developed, following a series of meetings held with researchers  
169 in each setting (7 Liberia-based researchers and 18 UK-based researchers). This framework sought to  
170 consider a people-centred approach towards the health system’s ability to respond to shock, whilst  
171 reflecting the realities experienced in the face of multiple routine challenges (Figure 1).[34] The  
172 nature of a shock to the health system, whether due to infectious disease outbreak, natural disaster,

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3 173 or conflict, influences the rest of the framework.[35] It adopts a people-centred approach at its  
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5 174 heart,[14,36,37] while incorporating literature relating to the health system's ability to respond to a  
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8 175 sudden shock, and the extent to which it is able to absorb, adapt and transform in response (Figure  
9  
10 176 1).[35,38–42]

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13 177 People-centred health systems prioritise the collective right to health through integrated and targeted  
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15 178 approaches that favour the needs of the most vulnerable.[14,43] Collective action and social solidarity  
16  
17 179 are viewed as essential to the art and science of the development of people centred systems that are  
18  
19 180 organised around people's healthcare needs and expectations as opposed to diseases, ensuring a  
20  
21 181 continuum of care throughout the life course.[14] This approach embraces the human character of  
22  
23 182 health systems, by viewing individuals, communities and health workers as co-producers of  
24  
25 183 healthcare, placing people and families at the centre.[44] Systems must adapt to meet a range of  
26  
27 184 challenges to support the development of strategies that seek to improve healthcare access and  
28  
29 185 encourage universal coverage. This is particularly important as many individuals transition and  
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31 186 oscillate between multiple roles of patient, family and sometimes healthcare provider within one  
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33 187 system.

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38 188 Interview topic guides were informed by the framework and developed across both settings to explore  
39  
40 189 key areas of health systems functioning in response to COVID-19 (Appendix 1). Questions included:  
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42 190 governance and decision-making; use of ethical guidelines; human resource management,  
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44 191 infrastructure (information technology and communications) and healthcare worker support;  
45  
46 192 introduction of innovations; and perceptions of the equity and quality of service delivery. Adaptations  
47  
48 193 were made according to the health systems context in each country, for example in Liberia, additional  
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50 194 questions were included to explore how learning from the EVD epidemic and other health systems  
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52 195 shocks informed COVID-19 response planning.

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56 196 Figure 1 placed here

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59 197 Study participants and data collection



198 The study was carried out at different levels of the health system across both settings (Table 1). In  
 199 Liberia, we conducted key informant interviews in June and July 2020 with 21 national level and 3  
 200 county level decision-makers (Nimba, Margibi and Montserrado Counties) purposively selected  
 201 because of their involvement with COVID-19 planning and/or routine service delivery. Some had also  
 202 played key roles in the EVD epidemic response. In Merseyside we conducted 42 key informant  
 203 interviews between July to September 2020, with regional, hospital and primary care decision-makers  
 204 (general practitioners and residential care home managers) and front-line workers selected because  
 205 of their involvement with COVID-19 planning and/or the delivery of COVID-19 or routine services (see  
 206 Table 1). More interviews were carried out within the UK across health systems levels, due to demand  
 207 for research across multiple levels and the presence of a larger team of researchers. In Liberia, by  
 208 contrast the demand for research was focused at national level, and the research team was smaller in  
 209 size. The national and county level actors in Liberia, spoke about Liberia's response as a country. In  
 210 contrast study participants in Merseyside from across health systems levels, including frontline health  
 211 workers, spoke of their own direct experience within a particular hospital or setting, or on behalf of  
 212 Merseyside City Region. We acknowledge the limitation that including national and county level  
 213 actors only within Liberia, creates a somewhat limited perspective. It would have been preferable to  
 214 have included a larger number and range of participants from sub-national health systems levels to  
 215 provide more depth of understanding about the COVID-19 response.

216 *Table 1 Study participants' role*

Participant Role	Number of Participants Interviewed
<b>Merseyside, UK</b>	
Regional decision-maker	5
Hospital decision-maker (Clinical director, medical director, ward manager)	4
Hospital consultant	11
Hospital health worker (junior doctors, nurses)	10
Health worker in community (GP, district nurse, residential care home)	7
Liverpool Clinical Laboratory staff	5
<b>Total</b>	<b>42</b>

<b>Liberia participants</b>	
National decision-maker	21
County decision-maker	3
<b>Total</b>	<b>24</b>

217

218 Interviews were predominantly carried out remotely by researchers experienced in qualitative  
 219 interviewing in English language, via online platforms such as Microsoft Teams or Skype. A minority  
 220 were carried out in person with physical distancing measures in place, according to local guidance at  
 221 the time. All interviews were audio-recorded. Data collection stopped when no new themes emerged  
 222 from additional data collected.[45] Interviews lasted approximately 30 to 60 minutes. Audio  
 223 recordings were transcribed verbatim, with quality assurance conducted by a second researcher  
 224 against the recording.

#### 225 Data Analysis

226 The study has sought to use a pragmatic approach to research, working through existing networks to  
 227 carry out timely research to support the ongoing COVID-19 response in both settings. Both inductive  
 228 and deductive approaches were blended within data analysis, in keeping with other health systems  
 229 research [46–49]. In both Liberia and UK, preliminary data analysis workshops were held separately  
 230 with the research team members involved with data collection. Prior to the workshops all participants  
 231 reviewed transcripts to familiarise and immerse themselves within the data in order to inductively  
 232 identify emerging themes which arose from within the study findings. Through these separate country  
 233 workshops key themes were identified and used to generate a separate coding framework for each  
 234 setting. All transcripts were imported into NVivo Version 12 qualitative data analysis software for  
 235 coding (QSR International Pty Ltd. Version 12, 2018). Following review of the initial themes which  
 236 emerged inductively from within the data, there was found to be strong alignment with the eight  
 237 FCDO principles. These principles were then deductively applied to assist with mapping the findings  
 238 and enabling comparison between settings. The research team did not simply accept the eight FCDO  
 239 principles, rather the team reviewed them and found that they did not fully cover all the aspects of

1  
2  
3 240 resilience which emerged from the data. As a result, two further principles were identified and applied  
4  
5 241 to adequately compare findings between both settings, relating to “mechanisms for advance  
6  
7 242 preparation” (Principle 9) and “adaptable governance and leadership structures” (Principle 10). The  
8  
9 243 application of the expanded FCDO principles for resilience has helped to showcase how Liberia’s  
10  
11 244 experience with responding to prior shocks and their learned need for early advance preparedness  
12  
13 245 provided an important element working towards resilience. This study is not funded by FCDO, nor  
14  
15 246 were FCDO involved in any way as researchers or co-authors within the research team.  
16  
17  
18  
19 247 Detailed findings and recommendations were developed into two policy briefs in accordance with  
20  
21 248 these expanded principles for resilience and were shared and discussed with relevant stakeholders  
22  
23 249 from both study settings.[29,50] The relationship of the findings to the original conceptual  
24  
25 250 framework was reviewed and findings compared between settings during a final on-line workshop,  
26  
27 251 attended by all those involved with data collection in both settings, with key similarities and  
28  
29 252 differences jointly discussed.  
30  
31

### 32 33 253 Ethics

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36 254 Ethical approval was received from the Liverpool School of Tropical Medicine Research Ethics  
37  
38 255 Committee (Protocol ID 20-045); the University of Liverpool Ethics Committee (Reference 7811) and  
39  
40 256 the University of Liberia-Pacific Institute for Research and Evaluation Institutional Review Board;  
41  
42 257 National Health Service Health Research Authority and Health and Care Research, Research Ethics  
43  
44 258 Committee (Reference 20/HRA/2597); Integrated Research Application System (Project ID 284143).  
45  
46 259 All study participants were provided with a participation information leaflet at least 48 hours prior to  
47  
48 260 interview. All participants provided written, or audio recorded consent to participate.  
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### 52 53 261 Patient and public involvement

54  
55  
56 262 Neither patients nor the general public were involved in the design, conduct, reporting or  
57  
58 263 dissemination of our research.  
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264 **Results**

265 We present findings according to the expanded FCDO principles for resilience (Box 1) (key illustrative  
 266 quotes are summarised for each principle in table 2). We then reflect on the findings in light of people-  
 267 centred health systems within the discussion.

*Box 1 Expanded Principles of Health Systems Resilience in the Context of COVID-19 Response*

- Principle 1** Develop flexible pathways for medical supplies  
**Principle 2** Prioritise a list of essential health services [*and continued provision of quality and equitable routine services*]  
**Principle 3** Build trust with local communities  
**Principle 4** Foster good communication at all system levels  
**Principle 5** Support, recognise and encourage staff  
**Principle 6** Facilitate rapid resource flow and greater flexibility in its use  
**Principle 7** Ensure agile tracking of health information  
**Principle 8** Cultivate effective partnerships and networks  
**Principle 9** Structures and mechanisms for advanced preparedness (**New principle**)  
**Principle 10** Adapt governance and leadership structures to facilitate timely decision-making and effective coordination of response (**New principle**)

268

269 *Table 2 Illustrative quotations from Liberia and Merseyside related to each FCDO Principle*

Principle	Comparison	Quotations
<b>Principle 1: Develop flexible pathways for medical supplies</b>	Supply chains disturbed across settings due to global shortages and price inflation. Lack of buffer stock in both settings. Restructuring of supply chains in Liberia led to disturbance for routine supplies.	<p>“Supply chain are affected greatly because their concentration is on how to provide the COVID response activities meaning the ...medicines and medical supplies that are needed [for] NTDs (Neglected Tropical Diseases), lack of attention will now be paid to that.” (LIB national decision maker 029)</p> <p>“With regards to PPE, there was national guidance about what we should do and there was a huge amount of fear amongst nurses and medics and everyone else understandably. Everyone was scared. I was scared. If someone said they weren’t scared, then they’re lying or they’re a fool. The national guidance was confused, and availability of PPE fluctuated. Procurement here [NHS hospital] did a very good job, but sometimes it just wasn’t delivered nationally. And we went through other supply chains...” (LIV hospital decision maker, Merseyside UK 014)</p>
<b>Principle 2: Prioritise a list of essential health services [and continued provision of quality and equitable routine services]</b>	Discontinuation of elective non-urgent care in UK, contrasts with early emphasis on continued routine care in Liberia.	<p>“So we just have to be robust and do the necessary investment into routine health services, preventive in terms of creating awareness and education among health workers about covid and how we can continue to care for our patients, with fighting the infection at the same time.” (LIB national decision maker 001)</p>

Principle	Comparison	Quotations
		<p><i>"There's the whole big risk around the screening program...the screening program was stopped, restarting that it's gonna be really challenging. And I suppose that's another risk in terms of people with delayed diagnosis and the right treatment, as a result of not having had that screening mammograms." (LIV hospital decision maker Merseyside UK 051)</i></p>
<p><b>Principle 3: Build trust with local communities</b></p>	<p>Both settings experiences reduced service utilisation due to loss in community trust. Introduction of innovative follow-up visits to patients led to increased service use in Liberia.</p>	<p><i>"Some of the useful things that we have been using from Ebola time is, as I said before, to involve the communities ...The community aspect is very important because it will help us for the COVID-19 where communities, family members, all of those at the community level are influential group they will be able to comply like we did in the Ebola." (LIB national decision maker 005)</i></p> <p><i>"The elderly population have been shielding because of comorbidities and all that. I think they probably not being as vocal about things that they're concerned about because they're worried about that they will be asked to come in. They fear that that they will catch Covid when they come here." (LIV hospital health worker Merseyside UK 048)</i></p>
<p><b>Principle 4: Foster good communication at all system levels</b></p>	<p>Expansion of virtual communication in both settings. In Merseyside frequently changing guidance from multiple sources created confusion.</p>	<p><i>"One of the things that quickly used to come to me is to be able to adapt to working with social media technology and all of that, because that's the first thing if you have to communicate with people in this manner you need to understand zooming, skyping, how to take notes.." (LIB national decision maker 029)</i></p> <p><i>"And there's so many different sources of information that say different things from what people hear within the hospital talking to friends on the corridor, that you've got to come out with a consistent message. And I think it took longer than was ideal to get a central source of information...But people need to be told what the situation is rather than try to be falsely reassured sometimes as well." (LIV hospital decision maker, Merseyside UK 004)</i></p>
<p><b>Principle 5: Support, recognise and encourage staff</b></p>	<p>Health worker redeployment was common across settings. Health worker training varied in UK according to cadre.</p>	<p><i>"Like take for example, when COVID came some of our workers from the [name] Hospital was recruited to go at the front line and [hospital name] is for routine services so taking employees from there to go at the front line that tells you it kind of understaff... So routine services kind of slow down and every attention was placed on COVID but going forward, with the system in place, routine services have gotten back on its feet." (LIB national decision maker 010)</i></p> <p><i>"And it felt like there was unequal share of knowledge and also an unequal kind of confidence in protective clothing. ... And I think the people that spent the most time with the patient, the patient</i></p>

Principle	Comparison	Quotations
		<i>areas, for instance, the healthcare assistants and the cleaning staff didn't have all of the information [at the] beginning or any PPE training.” (LIV hospital health worker Merseyside UK 017)</i>
<b>Principle 6: Facilitate rapid resource flow and greater flexibility in it's use</b>	Prior under-investment in health was common across settings. In Merseyside there was increased funding available and removal of bottlenecks, which enabled swifter action.	<i>“The first thing is, we need ownership by government, ownership is not depending on other countries to provide us the resources, to provide the technical capacity. So that is the best recommendation I would say. The ownership has to be there, resources have to be available and the infrastructure has to be available in terms of being resilient.” (LIB national decision maker 029)</i> <i>“To be honest, it was a fairly novel experience because it was a situation where if we asked we more or less got [funding].” (LIV hospital decision maker, Merseyside UK 004)</i>
<b>Principle 7: Ensure agile tracking of health information</b>	Data quality reduced in Liberia. In Merseyside increased data was collected, but inadequate data analysis measures were put in place.	<i>“Another recommendation is that we could include COVID-19 to our regular disease surveillance. Like we have the measles, the Lassa, and thing. I think we should include COVID because COVID maybe all around. Like we included Ebola, there should be a document on COVID-19 that will form part of our regular surveillance.” (LIB county decision maker 024)</i> <i>“...there's some value in looking at the things that we were looking at before COVID, because at least we have some longitudinal data on that so that we can see what the effect of COVID is.” (LIV hospital health worker, Merseyside UK 020)</i>
<b>Principle 8: Cultivate effective partnerships and networks</b>	Liberia was able to call upon prior decision-making structures (established during Ebola response) to enable swift decisions. Need for stronger engagement between primary and secondary care in Merseyside.	<i>“Involvement of multi-sectorial stakeholders in the response; that was one major thing that we learned from Ebola. And that has been brought to be on this response, so there has been a spark from the level of the presidency where they have key ministries and agency heads heading pillars on the COVID-19 response, involving the community people.” (LIB national decision maker 028)</i> <i>“I think one thing, it's really highlighted is the divide between hospital and primary care. We didn't work together very well before the epidemic, and we are still not working together very well. And I think if things were to get better, the whole health system needs to work better.” (LIV community-level health worker, Merseyside UK 033)</i>
<b>Principle 9: Structures and mechanisms for advanced preparedness</b>	Learning from Ebola prompted rapid preparedness in Liberia, in contrast to Merseyside.	<i>“If you don't prepare well and you are caught unaware you will have a lot of issues, so we didn't wait for COVID to enter Liberia before we prepositioned basic PPE and those are all part of the preparedness phase.” (LIB county decision maker 026)</i> <i>““It was blatantly obvious that anything we've ever planned for in relation to a pandemic or anything along those lines was not the plans that we needed... So I think going forward there needs to be almost a better planning system in place...it's not</i>



Principle	Comparison	Quotations
		<i>just a matter of just saying any pandemic it's about what kind of pandemic." (LIV hospital decision maker, Merseyside UK 069)</i>
<b>Principle 10: Adapt governance and leadership structures to facilitate timely decision making and effective coordination of response</b>	Need for rapid guidance from national level to enable sub-national decision making was common in both settings.	<i>"So, at this point in time we think if you give the resources, put the money in the hands of the county health team to buy what they need, that will be more effective ... So, we want decision should be given back to the people on the frontline so that they make the decision rather than a centralized point in Monrovia where people sit and decide for people in the lower level and the people choices made the right kind of thing they might need at that level." (LIB national decision maker 028)</i> <i>"... we were having to work, to a large extent, in the dark. The amount of guidance that came through nationally and even regionally, was actually relatively limited at that stage and we were having to do what felt like quite a lot of planning in isolation." (LIV decision maker Merseyside UK 008)</i>

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271 Principle 1 Develop flexible pathways for medical supplies: Across both settings supply chains were  
 272 disturbed due to global shortages and price inflation. In Merseyside there was a lack of personal  
 273 protective equipment (PPE) and laboratory reagents needed for COVID-19 testing. Meanwhile, in  
 274 Liberia, the disturbances related to routine supplies as supply chains shifted to focus on COVID-19  
 275 related procurement. In both settings, these challenges were felt to relate to global shortages, but  
 276 were worsened by failure to maintain buffer stocks at local and national levels. In both settings,  
 277 participants expressed the need for greater decentralisation of procurement decisions.

278 Principle 2 Prioritise a list of essential health services [and continued provision of quality and equitable  
 279 routine services]: Participants from Merseyside expressed fears that there was too much emphasis on  
 280 COVID-19 care, at times creating redundant capacity, while limiting access and quality of routine  
 281 essential services. The blanket discontinuation of all elective non-urgent care at the height of the first  
 282 wave in Merseyside, UK was felt to be unhelpful, and a more nuanced approach which seeks to  
 283 balance long-term as well as short term risks associated with health conditions was recommended. In  
 284 contrast, Liberia's early emphasis on routine health services was described as a key learning prioritised  
 285 by decision-making platforms following the country's experience with the EVD epidemic.

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3 286 COVID-19 adaptations in the UK led to increased telemedicine, with some respondents raising access-  
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5 287 related equity concerns, particularly for elderly populations, who may struggle to engage with  
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7 288 telemedicine. There were also concerns raised about quality of care, with some participants in  
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9 289 Merseyside fearing delayed-diagnosis, misdiagnosis or sub-optimal care due to restrictions limiting  
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11 290 physical contact with patients. In Liberia, limited opportunities for supervision, diversion of funds and  
12  
13 291 staff for routine services towards COVID-19 response, and limited community outreach activities (due  
14  
15 292 to physical distancing) were felt to impact quality of care. Across both settings innovations in service  
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17 293 delivery have emerged (see policy briefs for details).[29,50]  
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22 294 Principle 3 Build trust with local communities: In both settings, community trust to seek health  
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24 295 services declined, which reduced utilisation of services. In Liberia, fear among the population during  
25  
26 296 the start of the pandemic led to reduction in the uptake of health services including national routine  
27  
28 297 vaccination programmes and health facility-based delivery. This was felt to relate to a combination of  
29  
30 298 fear of contracting COVID-19 at facilities and to reduced community outreach activities. Innovative  
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32 299 community engagement and social mobilization strategies were introduced, for example follow-up  
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34 300 visits to pregnant women, which led to patients returning to use services after a few months. Another  
35  
36 301 example is the selective outreach home visits by the Neglected Tropical Disease (NTD) programme to  
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38 302 NTD affected patients, in order to avoid interruption in treatment provision. In Merseyside, utilisation  
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40 303 of non-COVID related services remained suppressed for much longer. This was deemed to relate to  
41  
42 304 widespread community mistrust, and Government campaigns which initially discouraged the public  
43  
44 305 from visiting health facilities via the national 'Stay at home' messaging. Applying learning from  
45  
46 306 Liberia's experience with EVD, the Government of Liberia placed a strong emphasis on working  
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48 307 alongside community governance structures, involving local authorities as part of COVID-19 response.  
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53 308 Principle 4 Foster good communication at all system levels: The need for effective communication  
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55 309 within the health system appeared to be a significant theme, particularly within findings from  
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57 310 Merseyside. The rapidly changing context during the early months of the pandemic created a wealth  
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3 311 of daily new information. Virtual forms of communication rapidly expanded in both settings, with  
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5 312 WhatsApp and online meeting platforms used extensively. Within Merseyside, referred to challenges  
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7 313 such as multiple sources of guidance and communication channels struggling to keep pace with the  
8  
9 314 changing guidance, which at times created contradictory messaging and confusion among health  
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11 315 workers. By contrast, Liberia developed a centralised messaging procedure with approval needed  
12  
13 316 from the department of Health Promotion before dissemination. In Merseyside, use of emails were  
14  
15 317 typically less popular with staff as these could often be too long and wordy. Participants expressed  
16  
17 318 limited scope for frontline staff to feedback on the information that had been shared.  
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22 319 Principle 5 Support, recognise and encourage staff: Staff redeployment was common across both  
23  
24 320 settings, contributing to varied workloads. In Liberia, health worker redeployment to COVID-19  
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26 321 treatment centres, alongside largely unchanged utilisation rates contributed to increased workload  
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28 322 for remaining health workers responsible for provision of routine services. By contrast in Merseyside,  
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30 323 redeployment resulted in over-staffing in certain COVID-19 wards. Although there was disparity  
31  
32 324 between health workers, with nurses experiencing increased workload. Due to the reduced volume  
33  
34 325 of patients seeking routine care in the UK, workload was variable for those providing these services.  
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36 326 The degree to which health workers received training about COVID-19 prior to having to manage  
37  
38 327 COVID-19 patients varied between settings, with Liberia carrying out training in identification,  
39  
40 328 isolation and infection, prevention and control, before the first case of COVID-19 arrived in country,  
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42 329 as a result of lessons learned following experiences responding to EVD. By contrast in Merseyside, the  
43  
44 330 roll out of training varied widely by cadre, with some participants identifying that healthcare assistants  
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46 331 and cleaning staff did not receive PPE training until later in the pandemic, compared with doctors and  
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48 332 nurses (see table 2).  
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53 333 Anticipated mental health implications for health workers emerged from the Merseyside data, due to  
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55 334 high rates of COVID-19 infection, exhaustion and high future anticipated post-traumatic stress  
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57 335 disorder (PTSD). This was associated with fear of making treatment mistakes, stress surrounding  
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3 336 patient escalation decision making, anxiety over potential COVID-19 infection (both personal and for  
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5 337 family), trauma surrounding high COVID-19 infections and deaths and reduced psychosocial support  
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7 338 due to remote working. Measures to support staff wellbeing were introduced (including counselling,  
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9 339 reflective therapy, peer support and mentoring, information made available about local support  
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11 340 services), with varied levels of uptake. This was not widely discussed in Liberia. Although measures  
12  
13 341 in Liberia to support staff wellbeing include psychosocial teams, roaming mental health counsellors  
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15 342 providing services to health workers are in place. In Merseyside, community support, strong solidarity  
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17 343 and teamwork were considered enablers of staff resilience.

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21 344 Principle 6 Facilitate rapid resource flow and greater flexibility in its use: Historic underfunding of the  
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23 345 health system in both settings has been highlighted by the pandemic. In Merseyside, this was  
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25 346 considered to be due to nearly a decade of austerity, which has created weariness and uncertainty;  
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27 347 whereas in Liberia it related to perception of reliance on external donors which predated the  
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29 348 pandemic. Our findings confirmed the need for adequate funding to ensure the building blocks of the  
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31 349 health system have received investment prior to the onset of any shock. With the arrival of the  
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33 350 pandemic the availability and flexibility of funding differed between settings. In Merseyside, UK, there  
34  
35 351 was increased central government funding, which was mostly freed of usual bureaucratic checks.  
36  
37 352 Managers noted that the removal of these bottlenecks allowed for swift action and rapid adoption of  
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39 353 innovations. Frontline managers' ability to make operational decisions was viewed as central to  
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41 354 resilience. In Liberia, however, there was an identified need for greater Government of Liberia  
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43 355 ownership. Some sectors of the health system, particularly those which are donor reliant struggled in  
44  
45 356 response to reduced partner support following the pandemic. Initially funding was not made  
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47 357 available, however funds for routine service delivery were re-allocated to COVID-19 response, with  
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49 358 implications for quality (see principle 2). Participants complained about excessive bureaucracy  
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51 359 associated with use of funds, which created delays.  
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3 360 Principle 7 Ensure agile tracking of health information: Health information systems (HIS) were rapidly  
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5 361 developed in the UK to collect huge quantities of surveillance data on COVID-19 and essential services.  
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7 362 However, there was need for improved skills to usefully interpret this data. Respondents in Liberia  
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9 363 stated that regular and timely submission of data, particularly from the community level had declined  
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11 364 since the onset of COVID-19. This was considered to relate to reduced data validation, with decreased  
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13 365 supervision visits due to physical distancing. In Merseyside complex new systems were designed to  
14  
15 366 collect pandemic surveillance data, however, data was frequently not analysed or made readily  
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17 367 accessible to staff to influence timely monitoring and quality improvement in services. In Merseyside,  
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19 368 respondents also noted that a number of new initiatives were introduced during the pandemic, such  
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21 369 as virtual consultations, but have not yet been systematically evaluated.  
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26 370 Principle 8 Cultivate effective partnerships and networks: The need for well-established partnerships  
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28 371 emerged in both settings, with Liberia already having clear multi-sectoral participation in decision-  
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30 372 making following the Incident Management System developed following EVD. Merseyside data  
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32 373 highlighted pre-existing weaknesses in collaboration between primary and secondary/tertiary care  
33  
34 374 have been exacerbated. In both settings the need for greater engagement with the private sector  
35  
36 375 was affirmed, with respondents from UK highlighting the need for stronger links regarding PPE supply  
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38 376 chain shortages and in Liberia the need to strengthen collaboration given perceived weakness in  
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40 377 private facility IPC standards. Partnerships were established within Merseyside, in a range of aspects  
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42 378 of service delivery, including: regional network of laboratory providers to address equipment  
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44 379 challenges and ensure COVID testing; between GPs to create service hubs; between disciplines and  
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46 380 departments within hospital to address staff shortages and share information. In Liberia, a reduction  
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48 381 in the number of partners providing response support was noted. This was a marked contrast to the  
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50 382 EVD response.  
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56 383 Principle 9 Structures and mechanisms for advanced preparedness (newly identified principle from  
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58 384 our findings): Within Liberia in particular, but also in Merseyside, there was discussion about  
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3 385 advanced preparedness. Respondents in Liberia emphasised how their experiences with previous  
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5 386 shocks, particularly EVD, had facilitated learning around early recognition of the need for  
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7 387 preparedness. For instance, there was consensus among respondents that waiting for COVID-19 to  
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9 388 reach Liberia before responding would be too late. There was early rapid mobilisation of existing  
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11 389 emergency response systems which had been established during the EVD response, including; health  
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13 390 check controls and quarantines at border points from January 2020; health worker COVID-19 training  
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15 391 before the first confirmed case; enhanced hygiene practices; restriction of physical contact and  
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17 392 sustained use of PPE, building on institutional memory gained through the EVD epidemic. In contrast,  
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19 393 respondents in Merseyside expressed that the COVID-19 response was impeded by a lack of pandemic  
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21 394 preparedness for new emerging infectious diseases.

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26 395 Principle 10 Adapt governance and leadership structures to facilitate timely decision-making and  
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28 396 effective coordination of response (newly identified principle from our findings): Being able to adapt  
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30 397 governance and leadership structures to facilitate timely response coordination emerged from both  
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32 398 settings. Liberia had previously established the incident management system (IMS) in 2014 as part of  
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34 399 the response to EVD. It was re-activated in March 2020 to guide planning their pandemic response,  
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36 400 led by the Minister of Health. This multi-sectoral team included a range of political and public health  
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38 401 decision-makers, donors and partner representatives. At the time the study was carried out, most  
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40 402 decisions were made centrally, with implementation at county level. In Merseyside, early response  
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42 403 was hindered by slow and centralised guidance and decision-making, which was perceived to be  
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44 404 oriented towards achieving political goals, rather than providing much needed clarity and recognition  
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46 405 of local reality. The limited scope for local autonomy was considered to strain relationships between  
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48 406 local senior leadership who sought to enforce central directives, and frontline staff, who wanted scope  
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50 407 to influence them. In both settings, there was interest in greater de-centralisation of decision-making  
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52 408 to lower levels.

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58 409 **Discussion**  
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3 410 Our findings demonstrate the commonalities between the principles for resilience and people-centred  
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5 411 health systems (Figure 2). We believe that maintaining a people-centred approach can help ensure  
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7 412 that COVID-19 related adaptations are acceptable, understood and meet the needs of individuals  
8  
9 413 (both patients and health workers). The values which underpin people-centred health systems  
10  
11 414 emphasise the need for equity, orienting health services towards a health system which puts “people  
12  
13 415 and communities at their centre, and surrounds them with responsive services that are coordinated  
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15 416 both within and beyond the health sector, irrespectively of country setting and development  
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17 417 status.”(page 9 [14])  
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### 22 418 **Adapting a people-centred framework**

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24 419 All ten FCDO principles (eight original principles and two principles identified through this study) are  
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26 420 mapped against the original conceptual framework, to demonstrate the connection between our  
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28 421 findings and existing literature about resilience (Figure 2) and recommendations in response to each  
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30 422 principle are outlined in box 2.  
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34 423 Figure 2 placed here  
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425 **Capacity and knowledge exchange**

426 The continuation of routine essential service delivery following a shock to the health system, has  
 427 previously been highlighted as an area of concern across a range of sectors.[51,52] Health systems

*Box 2 Recommendations from expanded FCDO principles for resilience*

1. Supply chains should pre-position adequate stocks, diversify sources and seek decentralisation of procurement. Collaboration between providers can prove valuable in securing continuity of supplies.
2. Routine services should be prioritised with a view to long term as well as short term impact, with prioritisation re-evaluated regularly as the pandemic progresses.
3. Maintain consistent communication and engagement with community leaders, as partners, to participate in pandemic planning within their respective communities.
4. Keep communication channels open, with regular updates for staff which highlight the key information, preferably through meetings, rather than email.
5. Ensure adequate provision of training, with sufficient PPE for health staff, particularly for those staff at highest risk of COVID-19 infection, alongside measures to balance workload and promote staff wellbeing. Prioritise compassionate leadership which is supportive of staffing levels and rotas, along with staff mental wellbeing. Investment in psychosocial wellbeing throughout and after the pandemic response.
6. Health systems need to be adequately funded during 'normal times' if they are to be able to respond when a shock arises. There is urgent need for investment to clear the backlog of delayed routine services.
7. Health information systems need greater investment in both the systems and the human element to be able to analyse, interpret and respond to emerging data trends.
8. Opportunities for multisectoral collaboration should be sought out, with engagement with private sector where possible.
9. Develop a proactive approach, with advance plans for health shocks, along with escalation and de-escalation plans throughout the crisis.
10. Promote greater opportunities for de-centralised staff involvement in decision-making, where feasible. Governments to prioritise an outward focus towards global solidarity.

428 need the capacity to continue to deliver services of good quality alongside responding to wider health  
 429 challenges.[42] Our findings for principle 2 highlighted that COVID-19 adaptations in the UK led to the  
 430 cancelling or postponing of many essential services, including those related to cancer care, which has  
 431 been anticipated to decrease life expectancy and survival.[52,53] Meanwhile, Liberia emphasised the  
 432 need for continuation of routine services and the promotion of patient confidence to use these  
 433 services. This is in contrast to the EVD epidemic, where over 80% reductions in maternal delivery care

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3 434 in EVD affected areas were described and form part of the reason why routine care was prioritised so  
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5 435 strongly as part of the COVID-19 response.[54]  
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8 436 Our findings relating to supply chain (principle 1) resonate with literature from previous shocks and  
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10 437 research emerging from the COVID-19 pandemic.[55,56] We found the need for greater flexibility,  
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12 438 with engagement with a more diverse range of suppliers and greater decentralised control over supply  
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14 439 chain across both settings. This is in keeping with a recent systematic review of supply chain resilience  
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16 440 literature, which identified the importance of diversity and the social aspects of supply chains during  
17  
18 441 a pandemic response.[55] Supplying commodities without investing in health systems strengthening  
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20 442 will not produce a robust supply chain, limiting ability to respond quickly and effectively to future  
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22 443 demands.[55]  
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27 444 We found a strong focus on the need for support for the health workforce, particularly in UK (principle  
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29 445 5). This was not as widely discussed in Liberia (though this may be a limitation relating to differing  
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31 446 levels of participants between countries). However, a previous study in Sierra Leone and Liberia,  
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33 447 highlighted that many providers may carry unresolved trauma from earlier shocks (including the Ebola  
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35 448 epidemic), which may have implications for them during the COVID-19 response.[57,58] Research  
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37 449 among health workers treating patients with COVID-19 in China, revealed health workers had a higher  
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39 450 prevalence of insomnia, anxiety, depression, somatisation and obsessive-compulsive symptoms  
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41 451 compared with nonmedical health workers, indicating the need for support and recovery programs  
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43 452 for these staff.[59] Stressors identified among workers in China, include many of those described by  
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45 453 participants in both settings within our study, particularly within Merseyside, including difficulties  
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47 454 feeling safe at work, lack of infection prevention and control (IPC) measures and COVID-19 knowledge,  
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49 455 long term workload, high risk of exposure to COVID-19, shortage of PPE and lack of rest, among  
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51 456 others.[59]  
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56 457 Our findings regarding resource flow to frontline providers (Principle 6), are in keeping with previous  
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58 458 study which identified funding as a core dimension within a health systems' ability to adapt and  
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3 459 respond to shocks.[60] A recent systematic review found aggregate public spending for health is  
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5 460 associated with improved life expectancy, reduced child and infant mortality and more equitable  
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7 461 health outcomes.[56]  
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## 10 462 **Relational and teamwork components**

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13 463 The relational components which exist are shaped by risk, trust, values, power, norms, and  
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15 464 culture.[42] These components play a role in determining the success (or failure) in response to a  
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17 465 health systems shock or crisis. In contrast to the FCDO recommendation for good communication  
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19 466 between actors (principle 4), our findings highlight challenges, particularly in the UK, where  
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21 467 communication channels struggled to keep pace with changing guidance creating contradictory  
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23 468 messaging and confusion among health workers. This is in keeping with previous study which found  
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25 469 differences in lines of authority and acceptability of communication pathways can contribute to  
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27 470 problems in communication.[34] In response, key principles were identified including participation  
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29 471 for all, respect, information sharing, collaboration and problem-solving.[34]  
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34 472 The need for strong governance structures and leadership which adapts to the response (principle 10),  
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36 473 was identified as a gap within early response in Merseyside. This was felt to have been hindered by  
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38 474 slow and centralised guidance and decision-making with a perceived limited scope for autonomy  
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40 475 within decision-making at lower levels. Within Liberia learning from the EVD response, and  
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42 476 establishing an incident management system (IMS) (led by the Minister of Health) and Special  
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44 477 Presidential Advisory Committee on Coronavirus (SPACC) (led by the President) early in planning their  
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46 478 pandemic response enabled timely decision-making.[27] In both settings, there was interest in greater  
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48 479 de-centralisation of decision-making to lower levels. Blanchet et al (2017) emphasised the need for  
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50 480 legitimacy within resilience, with requirement of capacity to develop socially and contextually  
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52 481 accepted institutions and norms.[40]  
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57 482 Looking more broadly, the conceptual framework highlights community engagement, with the  
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59 483 community being active participants of any health systems response (principle 3).[39] Our findings  
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3 484 emphasise the value of community engagement within the response within Liberia, based on lessons  
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5 485 from the EVD pandemic and in keeping with WHO recommendation that this be a key pillar within  
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7 486 COVID-19 country response.[8] Liberians across all socio-demographic groups responding to a recent  
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9 487 survey said they were very well, or somewhat well informed about the COVID-19 pandemic, with only  
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11 488 5% feeling not very well/ not at all informed.[27] This also emerged as a key finding in Singapore, with  
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13 489 engagement through new and social media channels monitored, with clarification of misinformation  
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15 490 by MOH.[61] In contrast to the findings from Liberia, participants from Merseyside highlighted the  
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17 491 need for stronger communication (although there were some examples of creative ways to engage  
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19 492 with diverse communities).

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23  
24 493 Learning from our study has emphasised the need to better prepared for, and respond to, health  
25  
26 494 emergency crises through integrated services (Principle 9).[44] A recent survey found most of the  
27  
28 495 population felt the Liberian government was doing well in managing the pandemic.[44] This  
29  
30 496 contrasted with findings from the UK where there was felt to have been a lack of adequate advance  
31  
32 497 planning and preparation. Two previous literature reviews highlighted that “preparedness depends  
33  
34 498 on health systems ability to learn from prior pandemics”, with responses often reactive rather than  
35  
36 499 proactive.[56,62]

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39  
40 500 The people-centred approach stresses the need for awareness and recognition of the  
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42 501 interdependencies of the health system with the community and other social systems, including  
43  
44 502 education, social protection and food security and their relationship with social determinants of health  
45  
46 503 (principle 8).[63] Our findings emphasise the need for strong partnerships with other sectors across  
47  
48 504 settings, in keeping with an identified success in Singapore’s response,[61] and is a key aspect of  
49  
50 505 Blanchet et al’s resilience framework, ensuring the capacity to engage with, and handle, multiple  
51  
52 506 actors and dynamics.[40]

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55  
56 507 Our findings, particularly from Merseyside emphasise the vast quantities of data being generated  
57  
58 508 through the COVID-19 response, but there are gaps in how this data is analysed and utilised within the  
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3 509 health system. The importance of adequate HIS is in keeping with previous studies.[40,60] A health  
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5 510 system's ability to identify and respond to an emerging threat is needed if it is to appropriately meet  
6  
7 511 emerging needs during a rapidly evolving health crisis or shock (principle 7).[40,41] A robust health  
8  
9 512 management information system (HMIS) is crucial to a health systems capacity to respond to  
10  
11 513 shock.[60] Health systems need to have the ability to combine and integrate different forms of  
12  
13 514 knowledge and to anticipate and cope with uncertainties and unplanned events.[40]  
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16  
17 515 COVID-19 has reflected and exacerbated existing social inequalities and emphasised the importance  
18  
19 516 of global collective action, rather than an individual response for genuine resilience. [8] Vaccine  
20  
21 517 inequity and a lack of global solidarity on the part of some richer countries, are dominating the current  
22  
23 518 phase of the pandemic. Our findings seek to highlight opportunity for shared learning across settings  
24  
25 519 in the Global South and North, emphasising the need for a global response to this and future shocks.  
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## 29 520 **Strengths and Limitations**

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32 521 The strengths of this study include the quality of data analysis, which involved a wide range of  
33  
34 522 researchers across both settings, and the breadth of perspectives captured from frontline staff and  
35  
36 523 key decision-makers early in the course of the pandemic. Our study had a number of limitations.  
37  
38 524 Within Merseyside, study participants were selected from across a range of health system levels  
39  
40 525 including primary care, hospital frontline workers and decision-makers, as well as regional decision-  
41  
42 526 makers. By contrast, in Liberia participants included national and county level decision-makers,  
43  
44 527 technicians and supervisors of frontline staff, with no direct frontline workers included. This may  
45  
46 528 result in some of the differences in findings, related to these differing perspectives. Perhaps the  
47  
48 529 greatest limitation of this study is that it was carried out at a single point in time. In Merseyside we  
49  
50 530 collected data towards the end of the first wave, at a time when there were few inpatients and people  
51  
52 531 were reflecting on the first wave. Meanwhile in Liberia it was carried out before there had been a  
53  
54 532 large increase in cases. Since the study was carried out there have been subsequent even greater  
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56 533 waves of cases within Merseyside, UK, and Liberia has experienced a large surge in cases of the delta  
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3 534 variant (59% of cases recorded in Liberia up until 17<sup>th</sup> July 2021, occurred during a six week period  
4  
5 535 from June 1 2021 to 17<sup>th</sup> July 2021).[64] By the weeks beginning July 24<sup>th</sup> to August 7<sup>th</sup> 2021 number  
6  
7 536 of confirmed cases had declined between zero to 43. Response measures have evolved in both  
8  
9 537 settings, and limitations identified through the study may have been addressed in subsequent stages  
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11  
12 538 of the pandemic.

### 15 539 **Conclusion**

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18 540 We found the ability of health systems to be able to absorb, adapt and transform in response to the  
19  
20 541 COVID-19 pandemic, in two very different settings, closely relates to the eight FCDO principles of  
21  
22 542 resilience.[16,40] We expanded these principles to include strong structures and mechanisms for  
23  
24 543 advance preparation, and adaptable governance and leadership structures to facilitate timely  
25  
26 544 decision-making and response coordination. At the heart of our findings lies the centrality of the  
27  
28 545 people-centred health system, where the person, is placed within their family, community and the  
29  
30 546 health system.[14] When all aspects work together the outcome is the extent of resilience  
31  
32 547 demonstrated within a health system in response to shock.[40] This includes both the provision of  
33  
34 548 specific services in response to the shock experienced, as well as continued provision of, and demand  
35  
36 549 for, 'routine care'. Our study highlights the need to maintain a people-centred approach for a resilient  
37  
38 550 health system response.

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6  
7

8 561 **Competing Interests**  
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10  
11 562 None declared.  
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13

14 563 **Author Statement**  
15

16  
17 564 RM prepared the first draft of the paper with inputs from all; Study design, conceptualisation, ethics  
18  
19 565 (ST, LD, MT, LF, IB, ZZ, RM, VW, HP, RAdC, RH, KK); conducted interviews in UK – RM, VW, MT, KO, HP,  
20  
21 566 SC, ST, TEH, RH, RD, YD, OH; conducted interviews in Liberia - ZZ, WT, HB, JK, JSS, CP, GZ, RM. All  
22  
23 567 interviewers participated in the cross-country analysis which was led by YA in the UK with inputs from  
24  
25 568 those who conducted UK interviews and LD, RM, ZZ, HB, WT, JK, JSS, GZ, CP in Liberia. All authors were  
26  
27 569 involved in critical review of the approach, inputted into and approved the final draft of the  
28  
29 570 manuscript.  
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32  
33 571 Figure 1 caption: Conceptual framework  
34  
35

36 572 Figure 2: Expanded principles for resilience and people-centred health systems framework  
37  
38

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54 579 **Data availability**  
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57 580 Data are available upon reasonable request.  
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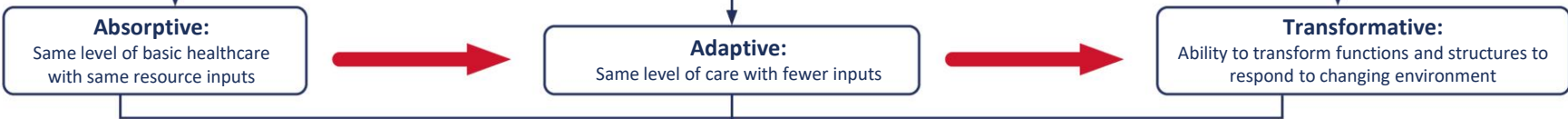
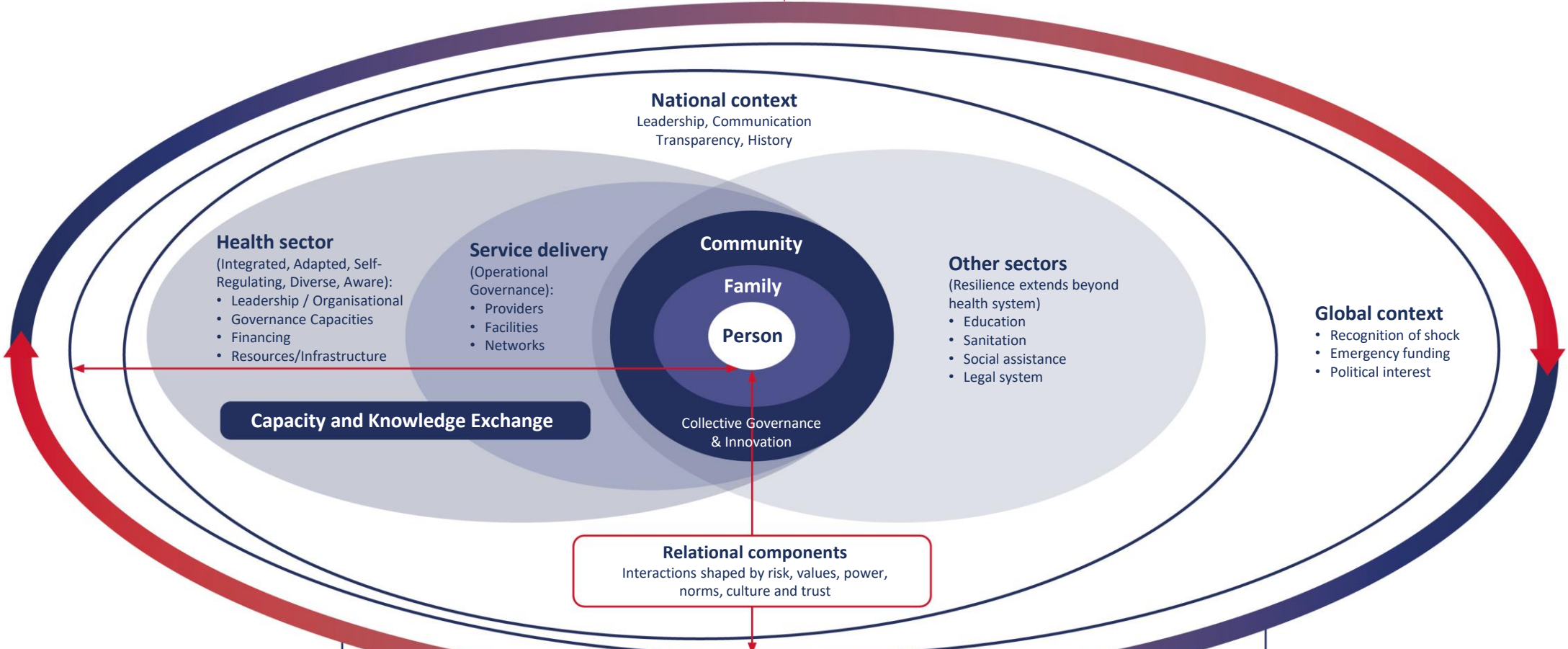
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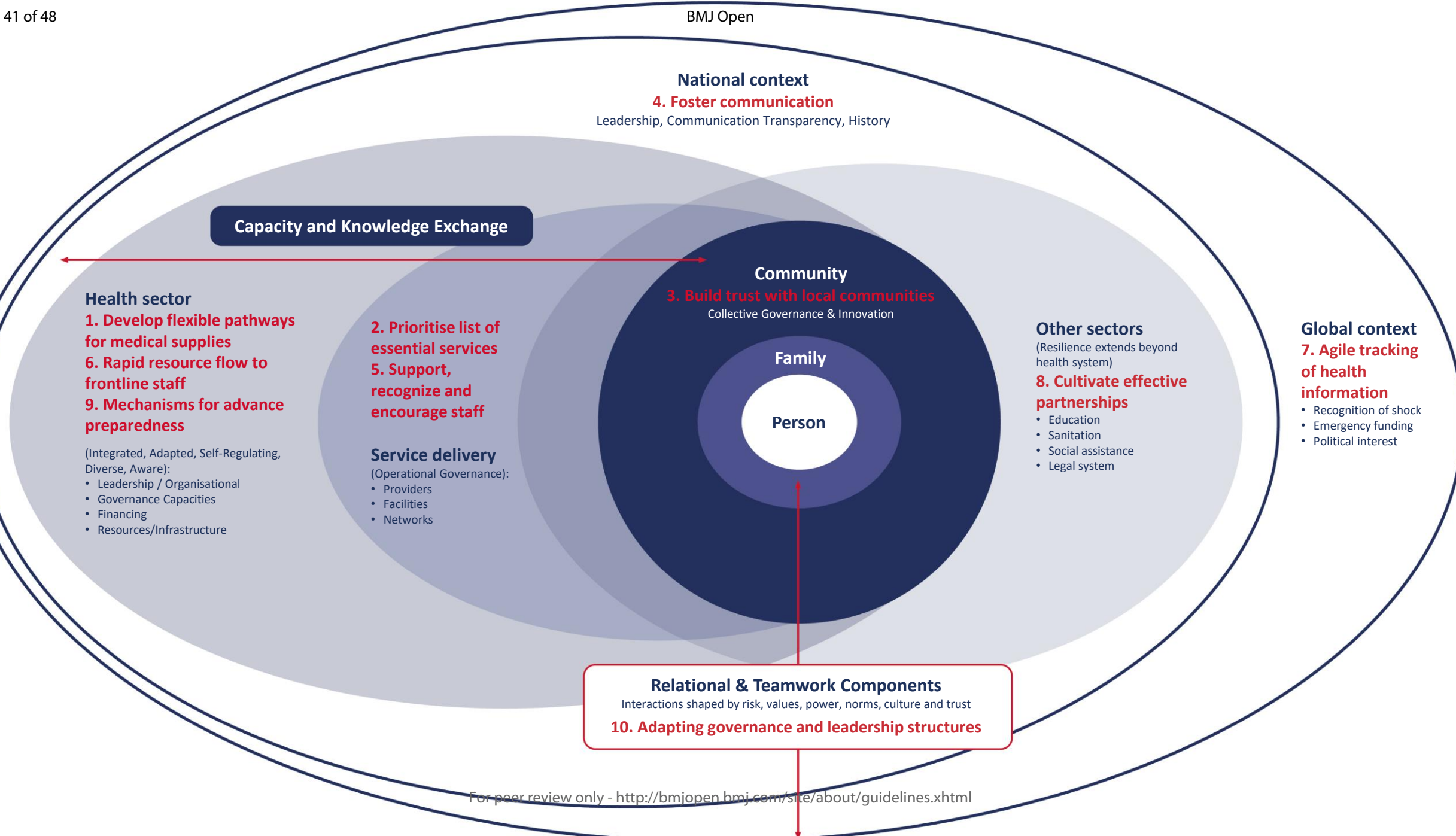
**NATURE OF THE SHOCK - CONFLICT, TERRORIST ATTACK, INFECTIOUS DISEASE OUTBREAK, NATURAL DISASTER, FINANCIAL, MIGRATION, CLIMATE CHANGE, CHRONIC CHALLENGES, OTHER**



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**Resilience**

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Appendix 1: COVID-19 Key Informant Interview Topic Guides

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## Key Informant Interviews Topic Guide –MOH Liberia

All possible questions to be asked of key informants are described in the following guide. Prior to interviewing each stakeholder, specific guides for these individuals will be made. One interview that covers relevant research themes will be completed with each stakeholder. Ordering of questions will also be revised to ensure logical flow through the interview and to avoid repetition.

### Background

Please can you tell me your position and how long you have worked in your current role?

How has your role changed due to the current COVID-19 crisis?

### Responses to Shock and the General Health System

1. How do you think the health system has coped with the COVID-19 crisis? How did it compare with previous crisis? How have routine services been impacted?
2. How is the current shock (COVID-19) the health system is experiencing similar or different to those you have experienced before?
3. What are the key learnings from previous shocks (Ebola/ conflict/ economic crisis)? How are they being used to respond now?
4. How do you think routine health systems functions are being impacted by the current crisis (COVID19/economic)?
5. What do you think could be done to support continuation of routine services? How is this informed or shaped by learnings from during the Ebola period?
  - a. How would you describe the quality of services usually? How is quality of care being maintained throughout the COVID-19 response?
6. What policy or guidelines are supporting with the current COVID response? What additional guidelines or policies could be helpful for the COVID response?

### Service Specific Impacts

**Questions in this section to be reviewed/modified for cross-cutting MOH functions, e.g. M&E, research division prior to starting interview**

7. Can you tell me about how service delivery within your programme/section (adapt to include name of section depending on who talking too) has been affected by the COVID pandemic?
  - a. Which of your services would you say have been most impacted so far? Why?
  - b. Which services would you envisage will be most impacted moving forwards? Why?
8. How have your routine services been modified or adapted? Which components of your service do you view as essential? Why?
9. Which specific sub-populations is routine care most impacted for? Are there any marginalised groups who may struggle to use services since the onset of the COVID-19 crisis? (Probe: e.g gender, dis/ability, rural/urban; wealth; geographic regions; age etc)
10. Have there been any innovations within service delivery in response to the COVID-19 crisis, and have they been useful in any way?
11. Has there been any innovations in response to COVID-19 that have concerned you?

### Human Resource Management

12. How have you planned for staffing to meet the changing additional workload in response to COVID? Any tools/ guidance from the human resource section? Successes and challenges? (Prompt for role of new community health cadres, for those providing face to face care and for MOH staff)
13. What additional skill development have you provided and how in response to COVID? Successes and challenges?
14. How are you able to support staff so they can continue to work effectively during the COVID pandemic
  - a. How have you supported staff through communication?
  - b. How have you supported staff for occupational safety including PPE?

COVID-19 Key Informant Interview Topic Guides



- c. How have you supported staff through with psychosocial support?
- d. What have been the successes and challenges with supporting staff?

### **Service and System Impacts: Governance and Decision Making**

**Questions in this section to be reviewed/modified to make these questions more service-specific, depending on the interviewee's programme area**

15. How are decisions made about which services should or should not be prioritised as part of the COVID response? (prompt for in relation to their specific service and also in relation to general health system, prompt for donor influence)
16. How does decision-making as part of the COVID response influence routine planning activities? What has been the impact of resource re-distribution as part of the COVID response?
17. Who is involved in this decision making and what are the processes? What are the challenges?
18. What do you think are the key ethical impacts of making these decisions? What ethical guidelines are currently in place and important in decision making during this period?
19. What guidance documents are available to support you in making decisions regarding COVID?
20. What guidance documents would help to support maintaining routine services?

### **Closing Questions**

21. What does a resilient health system look like to you? What are your three recommendations would you make to improve or maintain the resilience of the Liberian health system during this period?
22. What are your three recommendations would you make post crisis to ensure the return to routine function of the health system as effectively as possible?

Additional questions for Director of personnel only

23. What are the main sources of additional staffing (e.g. secondment/redeployment, task-shifting, improved productivity, early graduation/students, returnees, volunteers)? Successes and challenges? Optional: Impact on the wage bill?
24. What areas of service are now struggling with staffing?
25. What are you able to do to retain staff? Successes and challenges?
26. What impact did/is down-sizing of "non-essential staff" have on your programme during the crisis?

Thank-you

Any other comments?

## Key Informant Interviews Topic Guide –Merseyside Regional Decision Makers

### Version 1.1\_01052020

All possible questions to be asked of key informants are described in the following guide. Prior to interviewing each stakeholder, specific guides for these individuals will be made. One interview that covers relevant research themes will be completed with each stakeholder. Ordering of questions will also be revised to ensure logical flow through the interview and to avoid repetition.

### Question List

#### Background

Please can you tell me your position and how long you have worked in your current role?

#### Impact of COVID 19 on Routine Service Delivery

1. What are defined as essential routine services?
2. Which are the main scheduled and unscheduled services affected by COVID-19 and how have these been adapted over time?
3. Have there been any innovations within service delivery, and what have these been?
4. Have there been any changes that have concerned you? Why?
5. What would help to support maintaining routine services?

#### Governance and Decision Making

6. What has informed your decision-making, such as guidance documents or governance decision-making processes?
7. Who is involved in decisions made about which services should or should not be prioritised?
8. How are decisions made about which services should or should not be prioritised?
9. Describe how and who is involved in operationalising decisions?
10. What challenges have you faced in making these decisions?
11. What are the main differences between various sites in the trust, especially between Aintree and the Royal Hospitals?
12. How are changes in service delivery communicated? How can this be improved? There are multiple guidelines at national and local levels, how are these disseminated? How well does this work? How rapidly? How do health care workers respond to these changes?

#### Human Resource Management

13. How have you [may be the employer in general] planned for staffing to meet the changing additional workload? Any tools/ guidance from national authorities? Successes and challenges?
14. How have you planned for the increase in staff absence?
15. What additional skill development have you provided and how? What have been the successes and challenges?
16. How are you able to support staff so they can continue to work effectively (e.g. communication, occupational safety including PPE, psychosocial support)? What have been the successes and challenges?

#### Recovery post COVID-19

17. Are there any COVID-19-related changes to routine health services that you think it would be useful to continue after COVID-19? Which ones and why?
18. What next steps do you believe should be taken now to support the health system to recover post COVID-19?

## COVID-19 Key Informant Interview Topic Guides

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3 Thank-you

4 Do you have any further suggestions for improvements to delivery of routine services?

5 Any other comments?  
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## Key Informant Interviews Topic Guide – Health Workers

### Version 1.1\_01052020

All possible questions to be asked of key informants are described in the following guide. Prior to interviewing each stakeholder, specific guides for these individuals will be made. One interview that covers relevant research themes will be completed with each stakeholder. Ordering of questions will also be revised to ensure logical flow through the interview and to avoid repetition.

### Question List

#### Background

Please can you tell me your usual position and how long you have worked in that role?

Are you currently working in your usual role and department?

If no, what role and department are you now working in?

#### Impact of COVID 19 on Routine Essential Service Delivery

1. Can you tell me about how health service delivery has been affected by the COVID pandemic? What was the processes for this, how was it communicated and do you have any ideas about how this can be improved? How prepared did you feel for these?
2. What do you consider to be routine essential health services in your work?
3. Which are the main scheduled and unscheduled services affected by COVID-19 in your department and how have these been adapted over time?
4. What have been the strengths and challenges with these changes? How has quality been affected?
5. How should these changes be evaluated? What indicators should be used?
6. What is worrying you most about your service now?
7. Which services would you envisage will be most impacted moving forwards as the pandemic progresses? (e.g. hospital based, community care, disease specific services, etc) Why?
8. Who do you think are the people most impacted by the changes in routine service delivery? Would you say that patients with specific socio-demographic characteristics are more impacted by service disruption/distortion than others? Why? (e.g. gender, dis/ability; rural/urban; wealth; geographic regions; age etc) What can be done to ensure that these patients can still use health services when they need them?

#### Ethics and Decision Making

9. Have you encountered any health systems issues which you found troubling since the start of the COVID-19 pandemic? Would you be willing to tell me more about these issues?
10. What is the impact of these issues on you as a health worker? What would be helpful to support you in dealing with these issues?
11. Do you know of any ethical guidelines in place to guide you as you make difficult decisions during this time? What are these? How are these ethical guidelines operationalised? Are they useful?
12. Have you been involved with making decisions about the changes to health services since the COVID-19 pandemic? What was your role in making these decisions? How were these decisions made?
13. When there are changes in how health services are delivered how are these communicated with you? How has this worked? What do you think is the best way to be informed?

#### Human Resource Management

14. How has your role changed since the start of the COVID-19 pandemic? What have been the successes and challenges with how your role has changed? Probe workload
15. Is there anything about your role that concerns you? What?
  - a. Probe working outside are of expertise
  - b. No indemnity if make an error
  - c. Communication about working across disciplines

## COVID-19 Key Informant Interview Topic Guides

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3 16. What preparation for the changes to your role have you had and how was it delivered (skills - key ones,  
4 psychological support)? What have been the successes and challenges?  
5 a. Probe PPE training  
6 b. COVID clinical training  
7 c. Support mechanisms  
8 d. Team formation  
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10 17. What kind of support (e.g. communication, occupational safety including PPE, psychosocial support) are  
11 you receiving to do your job from your team/manager/employer? What have been the successes and  
12 challenges?

### 13 **Recovery post COVID-19**

- 14 18. Are there any COVID-19-related changes or innovations to routine health services that you think it would  
15 be useful to continue after COVID-19? Which ones and why?  
16 19. What next steps do you believe should be taken now to support the health system to recover post COVID-  
17 19?  
18 20. What is worrying you most as the response moves forward?

21 Thank-you

22 Do you have any further suggestions for improvements to delivery of routine services?

23 Any other comments?  
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## Key Informant Interviews Topic Guide –Merseyside Laboratory and Blood Transfusion Staff

### Version 1.1\_01052020

All possible questions to be asked of key informants are described in the following guide. Prior to interviewing each stakeholder, specific guides for these individuals will be made. One interview that covers relevant research themes will be completed with each stakeholder. Ordering of questions will also be revised to ensure logical flow through the interview and to avoid repetition.

### Background

Please can you tell me your position and how long you have worked in your current role?

### Governance and Decision Making - Relating Directly to COVID-19

1. What has been the decision-making process for the laboratory's response to COVID-19 testing services and when did discussions start around re-adjusting services for COVID-19?
2. Who held overall responsibility for how COVID-19 testing was going to be conducted at LCL?
3. In addition to PHE, have the Liverpool Clinical Laboratory services worked closely/ collaborated with any other external partners for COVID-19 testing? If so whom and in what capacity?

### Governance and Decision Making - Relating to Maintaining Routine Service Delivery

4. How are decisions made about which services should or should not be prioritised; which ones were considered to be essential and why? Who is involved in this decision making? How were these decisions communicated?
5. What guidance documents were most useful to you in making these decisions? In what way were they useful?
6. What key challenges have you faced in making these decisions? Do you have any support needs here?

### Impact of COVID-19 on Routine Laboratory Service Delivery

7. Can you tell me about how routine clinical laboratory service delivery has been affected by the COVID pandemic?  
COVID-19 Testing service specific
8. How did the laboratories adapt to scale up COVID-19 testing? (analysers, staff capacity, staff training, standard operating procedures, risk assessments)
9. What challenges did the laboratory face when implementing COVID-19 testing? How were they overcome? What worked well? (e.g. resources, human resource, process change, governance, culture, leadership etc)
10. Which routine services would you envisage will be most impacted moving forwards? (e.g. hospital based-testing, disease specific services, etc) Why?

### Recovery post COVID-19

11. Are there any COVID-19-related changes to the laboratory service that you think it would be useful to continue after COVID-19? Which ones and why?
12. What next steps do you believe should be taken now to support the laboratory system to recover post COVID-19?
13. Are there any changes/ innovations introduced in response to COVID-19 changes which you think should be continued? Why?

Thank you

Do you have any questions for me? Resources (re labs) link <https://www.rcpath.org/uploads/assets/90111431-8aca-4614-b06633d07e2a3dd9/Guidance-and-SOP-COVID-19-Testing-NHS-Laboratories.pdf>

COVID-19 Key Informant Interview Topic Guides

Table 1 Standards for Reporting Qualitative Research (SRQR)

<b>Standard</b>	<b>Page number</b>
S1 Title	P1, line 1-2
S2 Abstract	P2, line 12-35
S3 Problem formulation	P3 line 53-75
S4 Purpose of research question	P4, line 78-124
S5 Qualitative approach and research paradigm	P11 line 229-232
S6 Research characteristics and reflexivity	P8 line 165-190
S7 Context	P7 line 129-164
S8 Sampling strategy	P10 line 200-212
S9 Ethical issues pertaining to human subjects	P11 line 255-262
S10 Data collection methods	P8 line 167-171
S11 Data collection instruments and technologies	P9 line 191-198
S12 Units of study	P10 line 219-224
S13 Data processing	P11 line 224-226
S14 Data analysis	P11 line 232-249
S15 Techniques to enhance trustworthiness	P 11 line 226-227
S16 Synthesis and interpretation	P 13 line 267-410
S17 Links to empirical data	P13 line 267-272
S18 Integration with prior work, implications, transferability, and contributions to the field	P21 line 411-523
S19 Limitations	P27 line 524-542
S20 Conflicts of interest	P28 line 565-566
S21 Funding	P28 line 558-562