



Funding and undertaking research during the first two years of the COVID-19 pandemic: COVID CIRCLE updated report

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GL  PID-R


UK Collaborative on
Development Research



This report provides specific recommendations for action by funders to improve the implementation of the Funders Principles both for the ongoing pandemic and for future epidemics and pandemics.



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1. EXECUTIVE SUMMARY

This report provides specific recommendations for action by funders to improve the implementation of the Funder Principles both for the ongoing pandemic and for future epidemics and pandemics. The learning in this report is framed around COVID CIRCLE's' Funder Principles for Supporting High-Quality Research for the Most Pressing Global Needs in Epidemics and Pandemics' (1).

Global funders want to learn from the process of funding and undertaking research in the COVID-19 pandemic, both to inform ongoing responses within this pandemic and for future epidemics and pandemics. They therefore created the COVID-19 Research Coordination and Learning Initiative (COVID CIRCLE) to contribute to this through the provision of insights and recommendations to research funders, using evidence on the research response across both funders and researchers across Low- and Middle-Income Countries (LMICs).

As part of the development of COVID-19 research activities relevant to LMICs, several UK research funders worked together to create the COVID CIRCLE initiative. This was delivered by the UK Collaborative for Development Research (UKCDR) and Global Research Collaboration for Infectious Disease Preparedness (GloPID-R), building on their existing COVID-19 Research Project Tracker. A set of seven principles ('the Funder Principles') was developed to facilitate the alignment of research funders around coordinated efforts for supporting high-quality research, particularly in times of epidemics and pandemics (1).

These principles built on best practice guidance from many stakeholders and were intended to set standards that would accelerate and improve research outputs if applied through funding processes (such as grant conditions). The commitments set out in the principles aim to ensure that funding is aligned to relevant global, regional and local research priorities and that outputs are shared rapidly to enable consolidation and review, which in turn informs policy and practice during the COVID-19 pandemic, and should do so for future epidemics or pandemics.

Many examples of effective and innovative research funding and research practice that are in line with the principles have taken place during the COVID-19 pandemic. However, key challenges remain, which will require policy and funding innovation and sustained investment. For instance, globally, few multi-country research projects took place throughout the pandemic. Funding for COVID-19 research studies across LMICs were also comparatively thinly spread resulting in heterogeneous, small studies with limited impact for populations in LMICs (2). This has been compounded by equity issues related to access to the products of globally funded research (3, 4, 5).

Lessons Learned

- The global research response to COVID-19 over the first two years of the pandemic was unprecedented. Over the first year, UKCDR & GloPID-R's COVID-19 Funded Research Project Tracker captured 10,608 projects, funded by 201 funders, taking place across 142 countries, representing an investment of at least \$4.7 billion (as of 15th April 2021). As of 15 April 2022, after the first two years, the Tracker had captured 16,353 projects, funded by 319 funders, taking place across 157 countries and representing an investment of at least \$6.2 billion. Whilst there are limitations in the capture of this funding data that limit the conclusions that can be drawn (as detailed in the methodology), it is evident that the majority of funded research projects are taking place in High-Income Countries (HICs). However, the global distribution of funding shifted during the second year, with greater international and domestic funding captured for research across LMICs.
- Funder relationships and partnerships built during inter-epidemic periods are most easily activated during emergencies (e.g., GloPID-R and WHO efforts on the COVID-19 R&D Roadmap; UKCDR and GloPID-R efforts on COVID CIRCLE).
- Both funders and researchers appreciated the early development of the WHO Blueprint & GloPID-R COVID-19 Research Roadmap priorities (6), although the delayed availability and, in some cases, lack of regionally developed research priorities hindered their ability to align both funding and research to these priorities.
- The value of prompt prioritisation of areas for research focus and the application of priority agendas to set funding decisions were recognised as being essential for rapidly producing evidence for controlling COVID-19 infections. Efforts to further strengthen approaches for developing inclusive, adaptable research priority roadmaps and their effective application will be important for responses during future epidemics and pandemics.
- Many funders faced multiple barriers to rapidly funding research during the pandemic (which were exacerbated when funding LMIC partners) and lessons can be learned from those who overcame these. An important finding was that rapid funding was most easily facilitated through supplementing existing funded research activities and harnessing longstanding researcher partnerships and capacity.
- Researchers reported that the major barrier to their research during the pandemic was a lack of rapid (or pre-existing) access to funding and suitable research capacity. Rapid research was enabled where pre-existing partnerships and some level of funding were already in place.

- Greater focus on ethics and One Health research for future pandemics is needed, with expansion of collaborative partnerships as well as cross-cutting social science research in LMICs.
- Funders and researchers recognised the need to establish greater support for open science and data sharing practices in epidemics through ensuring trustworthy and equitable approaches that have the buy-in and support of LMICs. This was highlighted as an ongoing challenge by researchers working on COVID-19 across LMICs.
- Greater global funder collaboration is needed, including joint funding to ensure that high-quality multi-country studies can be funded to address research needs during pandemics.

RECOMMENDATIONS

For research funders responding to epidemics and pandemics (in particular in LMICs)

1. Alignment to global research agendas and locally identified priorities

- a. Support for the development and strengthening of research networks involving local funders in advance of future pandemics, to facilitate leadership for regional and local research priority setting, and adaptation of priorities and sub-priorities from WHO and/or other advisory agencies for local needs of LMICs through GloPID-R regional hubs.
- b. Provide agile mechanisms for dedicated funding or direct funding to LMICs to match their research needs for epidemics and pandemics.

2. Research capacity for rapid research

- a. Ensure sustained funding for building research capacity between epidemics and pandemics (including highly trained researchers through training, including leadership training and small grants for early researchers), linked with public health capacity building (including surveillance), clinical trial and research platforms, and national clinical data systems (where available). These can then be built on and linked by rapid response supplemental funding.
- b. Funder coordination to rethink the proposal review process during emergencies through a risk-based approach.
- c. Introduce funder policies which outline governance to override normal funding processes in emergency situations. Test these funding mechanisms during peace time to leverage them during emergencies.

3. Equitable, inclusive, cross-sectoral and interdisciplinary partnerships

- a. Increase emphasis on interdisciplinary research for epidemics involving LMICs.
- b. Increase (HIC) funder activity on epidemic research in least developed and Low-Income Countries in recognition that supporting HIC research gaps alone does not end a pandemic.

4. Open science and data sharing

- a. Raise awareness among funders and reviewers of the advantages of the open-science approach for epidemics and pandemics and existing initiatives and policy guidance.
- b. Develop clear and consistent data management and sharing guidelines across funders working with the research community, for rapid data sharing for different kinds of research (i.e., for biomedical research versus social sciences research) within epidemics and pandemics in alignment with the GloPID-R Data Sharing Roadmap.
- c. Provide guidance and funding to support with data sharing during epidemics or pandemics, e.g., set up of data sharing platforms in advance.
- d. Evaluate the implementation and impact of open science during COVID-19.

5. Protection from harm

- a. Specific funding allocation for personal protective equipment (PPE) training and other infection prevention and control (IPC) measures for those involved in the research process.

6. Appropriate ethical consideration

- a. Removal of operational bottlenecks to speed up ethics review process in emergencies.
- b. Increased research activity to explore ethical dilemmas in epidemics specifically in LMICs.

7. Collaboration and learning enhanced through coordination

- a. Provide funding for repurposing or extending existing partnerships, collaboration networks or coordination mechanisms.
- b. Enhanced collaboration between funders – possible coordinated or joint international funding calls to improve funding efficiency.
- c. Learn from existing rapid funding mechanisms (see case studies on R2HC and EDCTP) and those funders who developed rapid funding for COVID-19 (e.g., UKRI and CIHR rolling calls).

8. Cross-cutting

- a. Develop guidelines for “operationalising” the seven Funder Principles.
- b. Embed application of the seven Funder Principles in the entire funding process.
- c. Launch joint or coordinated funding calls to enable international research partnerships beyond individual funder remits through a GloPID-R mechanism.
- d. Provide funding for diverse types of research, e.g., health systems research funding, applied research, implementation science, and cohort studies.
- e. Develop guidance for funders to support research uptake within the timescales of an epidemic.

2. INTRODUCTION

2.1 PURPOSE

The purpose of this report is to present learnings from the COVID-19 pandemic to help research funders improve future responses to epidemics and pandemics, in alignment with the COVID CIRCLE ‘Funder Principles for Supporting High-Quality Research for the Most Pressing Global Needs in Epidemics and Pandemics’ or ‘Funder Principles’ (1).

2.2 SCOPE & AIMS

This learning is framed around the agreed Funder Principles (see Section 2.3.2). We have taken a global view, with a LMIC focus. Evidence was initially incorporated from the research response over the first year of the pandemic (until March 2021). Many elements have now been updated to show evidence from the first two years of the pandemic (until March 2022).

This report aims to:

- a. Explore barriers and enablers to research funders fulfilling the Funder Principles.
- b. Identify potential enablers or windows of opportunity for the translation of the Funder Principles into practice (a) within the ongoing COVID-19 research response in LMICs and (b) for future epidemics and pandemics.

The first version of this report was produced by synthesising data collected under the COVID CIRCLE initiative from January-June 2021, involving funder and researcher surveys, group consultations, key informant interviews, and analysis of the data in the UKCDR & GloPID-R COVID-19 Funded Research Project Tracker (7). This methodology has now been updated with further group consultations and analysis of the data included in the UKCDR & GloPID-R COVID-19 Project Tracker up to 15 April 2022. This report focuses on implementable recommendations for UKCDR and GloPID-R funders. These recommendations may also be of interest to other stakeholders, including other funders, policy makers and researchers beyond these networks. Recommendations focus on those principles where evidence was available, and further work will be necessary regarding certain principles (beyond the timeline of this report).

2.3 SETTING THE SCENE

Research funders have recognised the need to coordinate research funding during epidemics for many years, and this is the basis on which the **Global Research Collaboration for Infectious Disease Preparedness** (GloPID-R) was formed in 2013 by the European Commission and Heads of International Biomedical Research Organisations (HIROs) (8). GloPID-R is a global alliance of research funding organisations formed to facilitate coordinated research related to new and emerging infectious diseases with epidemic and pandemic potential. Since 2014, GloPID-R has mobilised and demonstrated the value in coordinating prioritisation and research funding during outbreaks, including Ebola (2014-15, 2018-19), Zika (2015-16), Lassa (2018), COVID-19 (2020-present), Novel hepatitis (2022), Monkeypox (2022) and Ebola (2022). GloPID-R has achieved this through a variety of different mechanisms, including convening global members to identify research priorities, fostering joint funding partnerships and knowledge sharing*.

The **World Health Organisation (WHO) Research & Development (R&D) Blueprint** is a complementary global strategy and preparedness plan, allowing rapid direction for research and development activities during epidemics. The Blueprint team emerged in 2016 following the 2014-15 West Africa Ebola epidemic, building on the success of the highly effective vaccine development but aiming to address some of the gaps that were apparent in the global research response effort. The R&D Blueprint intends to develop an R&D roadmap for its list of priority diseases to guide the research effort.

Early in the COVID-19 pandemic, WHO and GloPID-R convened the 'Global Research and Innovation Forum: Towards a Research Roadmap for the 2019 Novel Coronavirus' meeting on February 11-12 2020, resulting in the 'Coordinated Global Research Roadmap: 2019 Novel Coronavirus' (6) (WHO Roadmap), an unprecedented document for global research collaboration. Recognising the need for visibility of the aligned research funding response to address the priority areas identified in the WHO Roadmap, the **UK Collaborative on Development Research (UKCDR)** partnered with **GloPID-R** to launch the COVID-19 Funded Research Project Tracker (7) on 3 April 2020. The Tracker maps newly funded and repurposed COVID-19 projects to the WHO Roadmap, facilitating visibility of the funded research portfolio and its alignment to identified research needs in order to deliver a more effective and coherent global research response.

* <https://www.glopid-r.org/our-work/>

Research needs and response have been difficult to coordinate due to the urgency and global scale of the pandemic, and COVID-19 was unusual in recent history due to its rapid global spread and reach. There was particular concern that, due to national research resource limitations in LMICs, an uncoordinated approach could lead to failure to address local research needs, failure of research to inform policy, and/or a lack of sustained research capacity to respond to future outbreaks. The **UKCDR Epidemics Preparedness and Response Group** (in particular DHSC and MRC/UKRI, who established the joint GECO call (9), and Wellcome) and GloPID-R recognised the need to facilitate collective efforts for LMICs research and developed a set of Funder Principles to support high-quality research for the most pressing global needs in epidemics and pandemics. They formed the **COVID-19 Research Coordination and Learning (COVID CIRCLE) Initiative** in August 2020 (funded by UK DHSC, UKRI and Wellcome) (1). This initiative delivered the UK research funders' following aims: to create a community of practice for researchers addressing LMIC-focused research questions, to facilitate the reach of this research to the WHO and further policy makers, to improve and maintain the COVID-19 Funded Research Project Tracker, and to develop the living funding data analyses.

A key component of the COVID CIRCLE Initiative was ongoing learning from the research response with a focus on LMICs. Here we present that learning from the first two years of the COVID-19 research response.

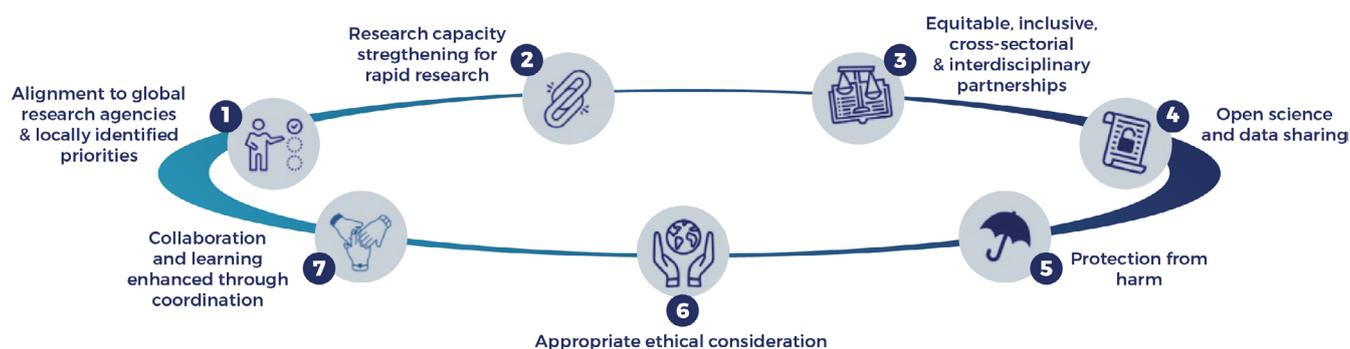
2.3.1. LESSONS LEARNED FROM PREVIOUS EPIDEMICS

Research funders have supported the rapid repurposing of existing studies and launched rapid funding calls to support research. Lessons in expediting research have been learned from undertaking research in the recent Democratic Republic of Congo Ebola outbreaks and West Africa Ebola, Zika and SARS epidemics. The COVID-19 pandemic has, however, led to unprecedented needs and challenges in regard to coordination and resourcing of research in LMICs. While research funders had learnt from research responses to a range of recent epidemics in LMICs, these lessons were not necessarily found to be fully transferable to a global pandemic, where research could be undertaken around the world.

At the outset of the COVID-19 pandemic, research funders recognised the need to coordinate COVID-19 research funding at all levels to prevent duplication and improve impact. They also recognised that this would be particularly important in resource-constrained environments. Funders such as EDCTP and the UK DHSC with MRC/UKRI launched early calls specifically to address the WHO Roadmap in LMICs. UKCDR and GloPID-R therefore co-created a set of principles to align research funders around a coordinated effort for supporting high-quality research for the most pressing global needs in epidemics and pandemics ('the **Funder Principles**').

These principles built on the substantive prior policy work by GloPID-R on research epidemic preparedness, relating to data sharing (10), clinical research (11), and social sciences research (12), combined with best practice for research with LMICs by UKCDR, ESSENCE on Health Research, TDR and others (referred to below) as well as the EDCTP and GECO call development.

2.3.2 FUNDER PRINCIPLES FOR SUPPORTING HIGH-QUALITY RESEARCH FOR THE MOST PRESSING GLOBAL NEEDS IN EPIDEMICS AND PANDEMICS



These principles were developed in July 2020 (2) and are proposed for endorsement by research funders, donors, governments or any other entities supporting research to address the most pressing global needs for COVID-19 and future epidemics and pandemics (collectively referred to as “the funders”). The core principles are intended to be applicable for any epidemic and additional points of relevance for COVID-19 are indicated with an asterisk.

Principle 1. Alignment to global research agendas and locally identified priorities

To consider global research priorities, such as those proposed by the WHO and other multilateral entities or regional bodies such as the African Union, as well as local research priorities, in addition to funder strategic priorities, when funding research for global benefit.

The [WHO R&D Blueprint \(13\)](#) was developed to help guide the research response for epidemics and pandemics and alignment with this and associated research roadmaps developed for a coordinated response focuses the funds available. It is recognised that certain global research priorities (or additional priorities) may be of particular relevance for research in resource-limited settings and consideration of locally identified priorities should also be reflected in the funding process.

For COVID-19, the [WHO Research Roadmap for COVID-19 \(6\)](#) has been developed by the [WHO R&D Blueprint \(13\)](#) team building on consensus from global researchers to help guide the research response for COVID-19

Principle 2. Research capacity for rapid research

a. To build upon existing research capacity and systems, where available.

For research to inform the health, economic and social policy and public health response in an ongoing epidemic or pandemic (or future outbreaks of the same pathogen), it needs to be implemented as rapidly as possible. Funders recognise that building on existing research capacity, platforms and systems is the fastest way to ensure that high quality research is conducted and knowledge exchanged and that the long-term impacts of epidemics and recovery are addressed. Incorporation of epidemic-relevant research

questions into existing research studies (for example, cohorts and clinical research networks) will be encouraged where possible, applicable and appropriate, to gain benefits from both rapid research activation, knowledge mobilisation and pre-existing relevant data.

b. To support capacity strengthening necessary for the research.

Funders recognise the need to strengthen research capacity, especially in resource-limited settings, and will consider the sustainability of any newly funded research capacity and whether it could be embedded for rapid activation in future outbreaks. Relevant guidance is provided by the work of the [ESSENCE Group \(14\)](#) including the [ESSENCE Good Practice Document on Capacity Strengthening \(15\)](#).

Principle 3. Equitable, inclusive, cross-sectoral and interdisciplinary partnerships

a. To support equitable partnership throughout the research process.

Equitable partnerships are needed to ensure successful, embedded research, which is locally relevant. Partnerships supported should be informed by relevant guidance such as UKCDR and ESSENCE's Four Approaches to Supporting Equitable Research Partnerships (16); [COHRED's](#) Research Fairness Initiative and Fair Research Contracting (17); and the Commission for Research Partnerships with Developing Countries (KFPE) 11 Principles for Research Partnership (18).

Funders may additionally support the aspiration that any new vaccines, diagnostics, and treatments developed for COVID-19 are globally available, appropriate, and affordable, regardless of where they have been developed or who has funded them, aligned with the [Global Collaboration ACT Accelerator \(19\)](#).

b. To promote inclusive and cross-sectoral partnerships to ensure that research is most likely to impact policy and practice.

Inclusivity is needed to ensure consideration of vulnerable or marginalised groups in the research agenda. Public and community engagement plays a particularly important role in achieving and maintaining trust for research within communities during outbreaks, informed by guidelines such as the [UNAIDS Good Participatory Practice Guidelines for Biomedical HIV prevention Trials \(20\)](#). Research partnerships should demonstrate that community and public engagement has taken place and will continue to do so.

Cross-sectoral partnerships across communities, government, public health, and non-governmental organisations all help to ensure that the research funded is most likely to impact policy and practice for the relevant government and public health organisations.

c. To promote interdisciplinary research

The importance of interdisciplinary partnerships for relevant and effective research in epidemics has been highlighted, including through the joint work of the [UK Academy of Medical Sciences, UK Medical Research Council and InterAcademy Partnership \(21\)](#).

Principle 4. Open science and data sharing

To require that research findings and data relevant to the epidemic are shared rapidly and openly to inform the public health response.

Rapid research findings, data sharing, and open access publishing can accelerate health benefits through: facilitating research projects; reducing the duplication of work; and ensuring a clearer picture of the disease through pooled results to improve intervention effectiveness. Funders will be informed by relevant guidance such as the [GloPID-R Roadmap for Data Sharing](#) (10) (in particular, the guidance on grant conditions requiring rapid sharing of quality assured data and development and review of data management plans in alignment with the [FAIR Guiding Principles for scientific data management and stewardship](#) (22) as well as the associated [GloPID-R Principles of Data Sharing in Public Health Emergencies](#) (Timely, Ethical, Accessible, Transparent, Equitable, Fair, Quality) (23)).

For COVID-19 the joint statement on [Sharing research data and findings relevant to the novel coronavirus \(COVID-19\) outbreak](#) is pertinent (24)

Principle 5. Protection from harm

To take all reasonable steps to anticipate, mitigate and address harm to those involved with research funded.

Everyone involved in the research chain, from research funders, planners and practitioners to local community members, has the right to be safe from harm. Funders working in international development research will be informed by guidance such as [UKCDR's guidance on safeguarding in international development research](#) (25).

For COVID-19 there is a companion piece on [practical application of the UKCDR safeguarding guidance during COVID-19](#) (26).

Principle 6. Appropriate ethical consideration

To ensure appropriate ethical consideration is embedded throughout research conducted, in particular regarding access to the products of research.

Ethics should be at the heart of funding decision-making and considered throughout the research process, including informing approaches to ensure that the optimal value is being obtained from the research for all parties involved. Relevant guidance is provided by the [Declaration of Helsinki International Ethical Guidelines for Health-related research involving humans by the Council for International Organizations of Medical Sciences](#) (CIOMS), [Nuffield Bioethics for public health emergencies – recommendations](#) (27) and [The Global Code of Conduct for Research in Resource-Poor Settings](#) (28).

For COVID-19 the [WHO Ethical Standards for research During Public Health emergencies: Distilling Existing Guidance to Support COVID-19 R&D](#) (29) is pertinent.

Principle 7. Collaboration and learning enhanced through coordination

Coordination to ensure maximum impact of investments for research on the most pressing global needs for epidemics through cross-funder and cross-researcher collaboration, learning and evaluation.

- a. To map research funded, use these data to enhance coordination, and ensure it is publicly available.

Maximising the value of research investments requires accessible, comprehensive and coherent information on what and where others are investing to help identify funding gaps or duplication and inform or direct future investments. Research funded needs to be mapped publicly, for example through [World Report \(30\)](#).

For COVID-19 the [COVID-19 Research Project Tracker by UKCDR & GLOPID-R \(7\)](#) is pertinent. The Research Project Tracker is aligned with the [WHO Research Roadmap for COVID19 \(6\)](#) to facilitate informed decision-making and targeting of funds where there is need.

- b. To foster collaboration between studies funded in epidemics and facilitate shared development of research protocols, data collection tools, data sharing and exchange of knowledge.

Collaboration between researcher communities can facilitate trust, foster new partnerships, and improve research outcomes and their impact. Where relevant, funded researchers will be supported to embed in relevant or, co-create communities of practice or an equivalent that promote shared development of research protocols, data collection, purpose driven data and results sharing.

- c. Where relevant, to embed operational research and support impact evaluation across funded projects to learn from and improve future funder and researcher responses for epidemics.

Conducting research during epidemics is still a relatively new endeavour and it is important to embed operational research (research on research) and impact evaluation where relevant. In particular, this should aim to identify how the research response can be improved, including how to overcome barriers to achieving the Funder Principles outlined here (building on prior work undertaken by GloPID-R and GOARN Research such as the PEARLES review (31) and GloPID-R Roadmap for Data Sharing (10)).

2.4 THIS REVIEW

The purpose of this review is to improve the implementation of the 'Seven Funder Principles for Supporting High-Quality Research for the Most Pressing Global Needs in Epidemics and Pandemics' (Funder Principles) for the ongoing COVID-19 pandemic and for future epidemics and pandemics.

The scope of this review focuses on implementable recommendations to global research funders (in particular, members of the UKCDR and GloPID-R funders groups). These recommendations will also be of interest to other stakeholders including non-member funders, policy-makers and researchers.

This review has been produced by synthesising the challenges to fulfilling the Funder Principles and potential solutions have been identified through the following means, under the COVID CIRCLE initiative, over the last eighteen months:

The COVID CIRCLE Living Mapping Review, including alignment of research to WHO, LMICs and UN research priorities, and additional ‘vertical’ analyses from the UKCDR & GloPID-R COVID-19 Funded Research Project Tracker, now including UKCDR and GloPID-R membership analyses. Full details available as Annexes B and C.

Collaborative analyses on the UKCDR & GloPID-R COVID-19 Funded Research Project Tracker with the WHO COVID-19 working groups on ethics and social sciences (May-August 2022). Full details available as Annex B.

A funders’ survey (open 1 February to 15 March 2021) and funders group consultations (between 21 February and 22 April 2021). Full details available as Annex D.

A researchers’ survey (open 20 March to 23 April 2021) and researcher group consultation (23 June 2021). Full details available as Annex E.

Group consultations with the GloPID-R LMICs Sub-Working Group on Research Prioritisation through 2022. Full details available as a separate report and case study to be published on the GloPID-R website shortly.

A review of funders’ internal evaluations of their COVID-19 funding response (as provided by August 2022)

Challenges and potential solutions are mapped against the Funder Principles and recommendations for improved practice are provided. We also provide case studies, developed in 2021 and now updated in 2022 (Annex A), to demonstrate examples of best practice in research funding against a range of these principles.

3. THE FIRST TWO YEARS OF THE COVID-19 RESEARCH FUNDING RESPONSE

The UKCDR & GloPID-R COVID-19 Funded Research Project Tracker (7) was launched on 3 April 2020 in a joint effort by UKCDR and GloPID-R to further coordinate and synergise the funding of COVID-19 research to address the WHO Roadmap priority areas.

The full methodology and limitations of the database are outlined in the Living Mapping Review (LMR), however it is important to reiterate here that the comprehensiveness of the Tracker is limited to the funders that have either provided data for the Tracker, or had their data extracted from online sources (if available) and is further limited by the quality of that available data. In this respect, there were challenges in engaging with (and obtaining data from) health research funders beyond existing networks, either due to a lack of contacts or capacity from funders to contribute to the project (especially for funders whose award information is not in English). This therefore means that the analysis presented below needs to be interpreted with caution, due to the many limitations. Additionally, the Tracker does not contain information from industry. **In addition there were challenges obtaining funding amounts for many funders, which has resulted in many of the analyses needing to focus on project numbers despite this not being the best metric for investment.**

The Tracker is a live database of funded research projects across the world related to the current COVID-19 pandemic supported by the COVID CIRCLE initiative – including both newly funded and repurposed research projects coded against the WHO Roadmap. In order to facilitate interpretation of the Tracker data, COVID CIRCLE established a Living Mapping Review (LMR) (33) published on Wellcome Open Research to provide three-monthly analyses across the Tracker data (7). The LMR provides an overview of the full database, giving a comprehensive picture of the research funding response from the data available in the Tracker.

The latest version of the LMR (34), published on 16 November 2022, shows that, as of 15 April 2022, the database contains 16,353 projects, funded by 319 funders, taking place across 157 countries and representing an investment of at least \$6.2 billion. The majority of research funded (captured in the Tracker) aligns well to the WHO Roadmap priorities, however low levels of funding for ‘Ethics considerations for research’ and ‘Animals and environmental research’ persist. In addition, most funded research projects are taking place in HICs, although the global distribution of funding has gradually been shifting, with greater international and domestic funding captured for research across LMICs. However, many research gaps remain in LMICs, including research related to health systems, optimal personal protective equipment use, health care worker support, community engagement, disease severity studies, and effective public health interventions in various settings. The LMR also shows that research is being funded beyond the remit of the WHO Roadmap, specifically

relating to broader vaccine research, social sciences disciplines (policy and economy; education; logistics; and food security), and environmental research.

In many cases, funders and researchers are increasingly starting to focus on recovery (rather than response) and we have now mapped data from the UKCDR & GloPID-R COVID-19 Funded Research Project Tracker to the '[UN Research Roadmap for the COVID-19 Recovery](#)' (UNRR) to better capture this work. Across the five thematic pillars identified in the UN Research Roadmap, the 'Social protection and basic services' pillar had the largest number of associated research projects, with the 'Health systems and services' pillar ranking second in terms of the total number of research projects (although this pillar had the highest known research funding attached to it). The UN research priorities (five of which sit under each pillar) allowed mapping of a much greater proportion of the social science projects captured by the Tracker. The LMR shows that the 'Macroeconomic policies and multilateral collaboration' pillar has the least number of projects overall, with all five related research priorities among the six lowest funded research areas.

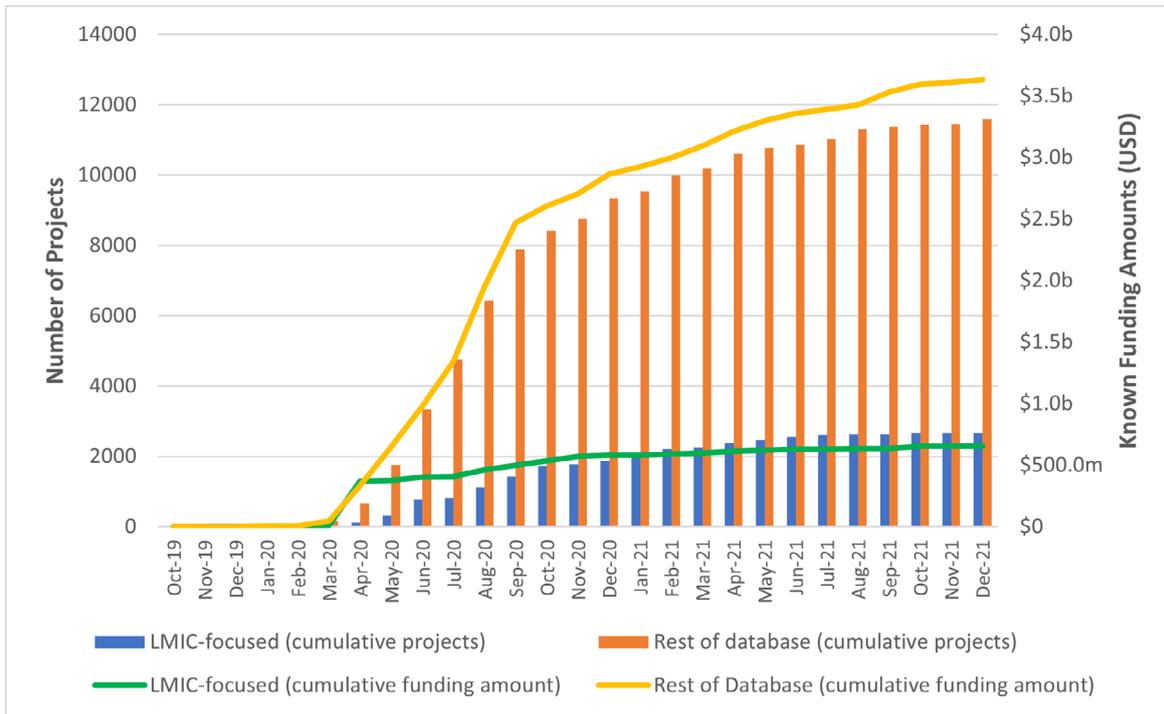
Full details of this analysis are available in our '[Living Mapping Review for COVID-19 funded research projects: twenty-one-month update](#)' (34).

This report undertakes supplementary analyses on that same data set, with a focus on LMIC-based (and 'LMIC-focused') research (defined as any research project that is taking place in at least one LMIC, even where this is in collaboration with HICs). These analyses specifically contribute to our learning in relation to the extent to which the Funder Principles may have been applied over the first two years of the research response. Highlights are presented below, and the full analysis is available in Annex B.

3.1 OVERALL TIMELINE OF LMIC-FOCUSED FUNDING

To understand the (approximate) timeline of the research response to the pandemic, Figure 1 displays data on the publication date of award information by funders (where available). The increase in the number of LMIC-focused projects was greatest in June 2020 (473 projects) – two months before the peak increase for the rest of the (non-LMIC-focused) database in August 2020 (1,659 projects). Figure 1 also shows that a greater proportion of LMIC-focused data was added to the Tracker in 2021 (30.2% of projects where publication dates were available) than the rest of the (non-LMIC-focused) database (19.5%). In terms of funding amounts, while Figure 1 shows that the greatest increase for LMIC-focused projects took place in April 2020 (\$360.7m), four months prior to the greatest increase experienced for the rest of the database (\$608.7m in September 2020), it is worth reiterating issues arising from the incompleteness of financial information. Specifically, financial information could only be obtained for 61.3% of the projects in the entire database. This figure is reduced to 39.5% when only considering LMIC-focused projects. With less than half of the LMIC-focused projects having financial information, greater emphasis in this analysis is therefore placed on the number of projects, even though this is not the best measure of investment and this report emphasises the importance of funders making fewer and more strategic collaborative investments.

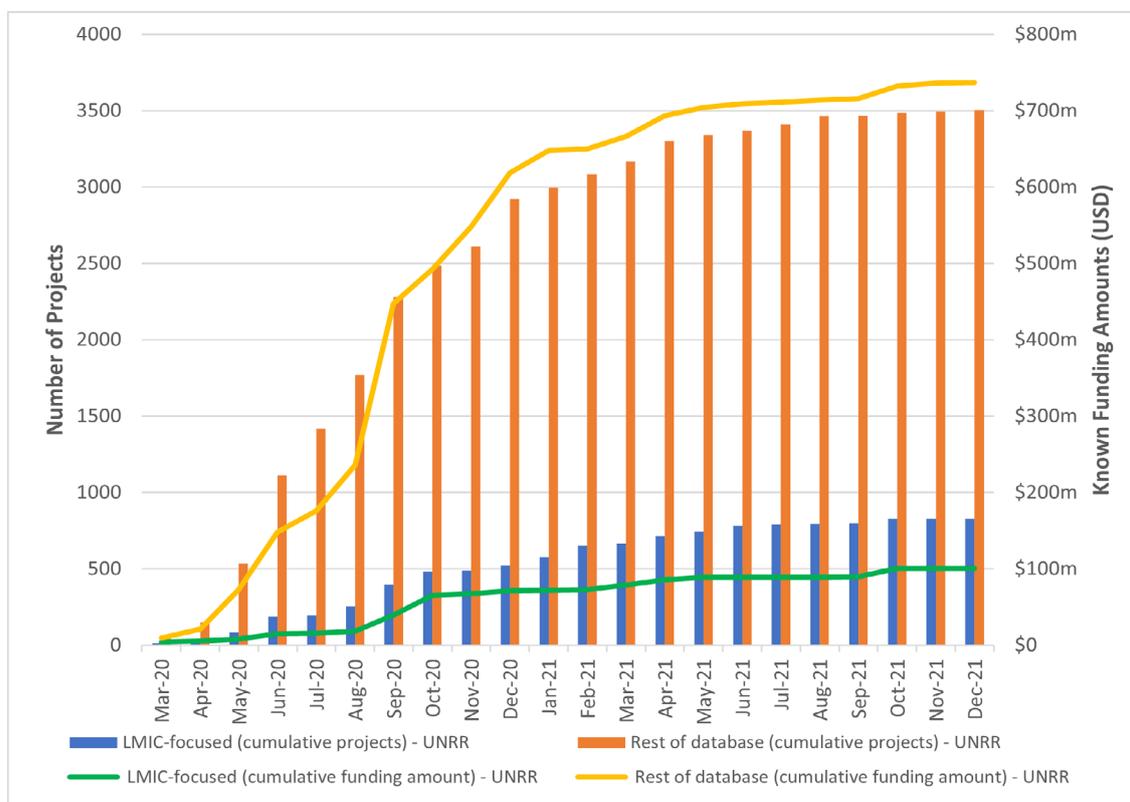
Figure 1 – Cumulative number of projects and known funding amounts by publication date of award information of projects on tracker



Note for Figure 1: Financial information available for 61.3% of all projects in entire database (39.5% for LMIC-focused projects). Publication date available for 90.2% of projects in entire database (92.2% for LMIC-focused projects).

Interestingly, while the peak increase in the number of LMIC-focused projects occurred earlier than for the rest of the database, further examination of the timeline reveals that the research response was slower to pivot to issues addressing the COVID-19 recovery and post-pandemic world for LMIC-focused projects than for the rest of the database (Figure 2). While the summer of 2020 saw the largest increases in the number of projects addressing the pillars in the UNRR, the cumulative progression was slower for LMIC-focused projects than for the rest of the database, as more than half of the dated LMIC-focused projects had publication dates from October 2020 onwards (52.2%), whereas just over a third of the rest of the database did so (34.9%).

Figure 2 – Cumulative number of projects addressing UN Research Roadmap pillars and known funding amounts by publication date of award information of projects on tracker



Note for Figure 2: Financial information available for 61.3% of all projects in entire database (39.5% for LMIC-focused projects). Publication date available for 90.2% of projects in entire database (92.2% for LMIC-focused projects).

3.2 FUNDERS OF LMIC RESEARCH

A total of 153 funders based in 45 countries have funded LMIC-focused COVID-19 research.

To understand the thematic nature of the research funded by the ten funders with the greatest number of LMIC-focused research, Table 1 summarises their portfolios, respectively, against the WHO priority areas. Notably, the top two priority areas for nine of the ten funders included in Table 1 were either the priority area of ‘Social sciences in the outbreak response’ or ‘Clinical characterization and management’. At the other end of the spectrum, only half of the funders in Table 1 funded any projects under the ‘Animal and environmental research on the virus origin’, ‘Management measures’ at the human-animal interface’ priority area, or ‘Candidate vaccines R&D’.

Further analyses of these data can be found in Annex B.

Table 1 - Portfolio by WHO priority area of top 10 funders of LMIC-focused research

Funder (known value of LMIC-focused portfolio)	Virus: natural history transmission and diagnostics	Animal and environmental research	Epidemiological studies	Clinical characterization and management	Infection prevention and control	Candidate therapeutics R&D	Candidate vaccines R&D	Ethics considerations for research	Social sciences in the outbreak response	TOTAL LMIC - focused Projects
MINCYT Argentina (\$6.3m)	37	2	29	31	39	8	0	0	55	189
CNRST (N/A)	18	0	22	30	16	10	0	2	86	177
DPI (\$5.7m)	15	0	16	21	18	13	0	4	74	150
FAPERJ (N/A)	43	2	17	55	6	24	4	0	18	136
CONACYT Mexico (N/A)	38	1	14	17	15	12	4	2	42	132
UKRI (43.5m)	22	3	21	13	14	4	4	2	65	122
FAPESP (\$2.3m)	43	0	8	53	4	27	10	0	19	106
SERB India (\$139k)	29	0	30	11	11	27	3	0	2	95
NRF ZA (N/A)	9	1	10	5	7	2	0	5	58	77
DHSC/NIHR (\$19.1m)	8	0	10	5	19	2	0	2	55	76

Note for Table 1: Emphasis has been placed on presenting the number of projects as opposed to amounts awarded by funders as financial information was only available for 61.3% of all projects in entire database (39.5% for LMIC-focused projects).

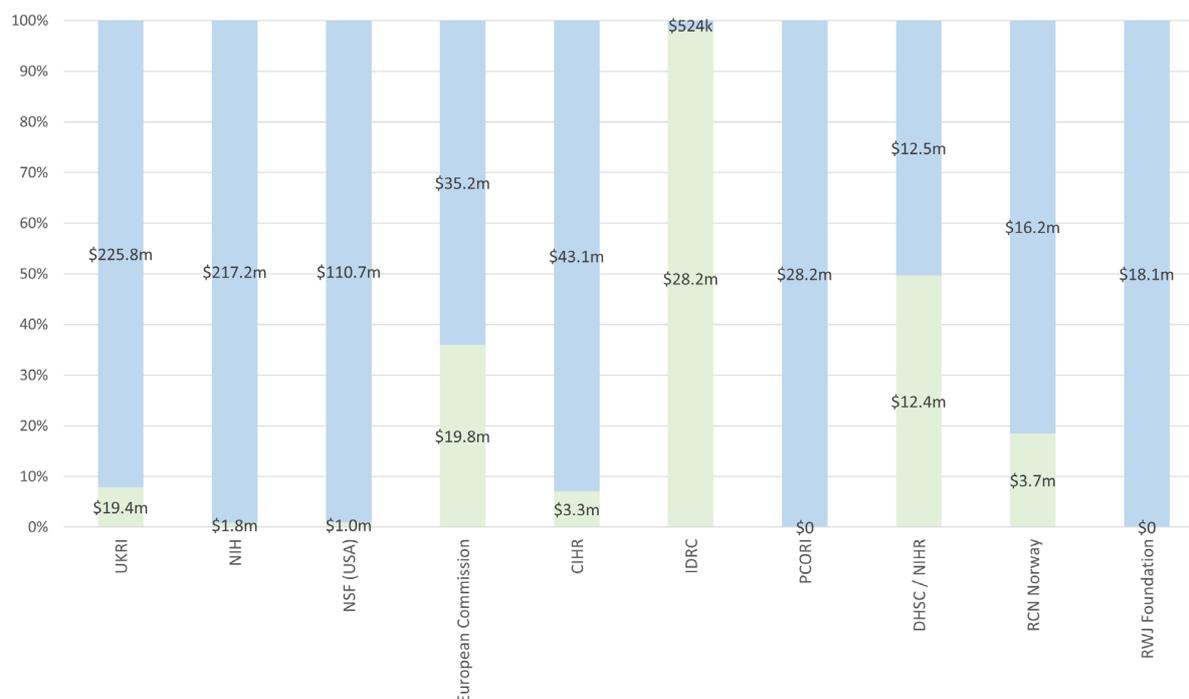
Abbreviations and acronyms: **CNRST:** Centre National pour la Recherche Scientifique et Technique (National Center for Scientific and Technical Research Morocco); **CONACYT** - Consejo Nacional de Ciencia y Tecnología (Mexico National Council of Science and Technology); **DHSC** - Department of Health and Social Care (UK); **DPI** - Decanato de Pesquisa e Inovação (Dean of Research and Innovation); **FAPERJ** - Fundação de Amparo à Pesquisa do Estado do Rio de Janeiro (Research Foundation of the State of Rio de Janeiro); **FAPESP** - Fundação de Amparo à Pesquisa do Estado de São Paulo (São Paulo Research Foundation); **MINCYT** - Ministerio de Ciencia, Tecnología e Innovación (Argentina Ministry of Science, Technology and Innovation); **NIHR** - National Institute for Health Research; **NRF ZA** – National Research Foundation South Africa; **SERB** - Science and Engineering Research Board; **UKRI** - UK Research and Innovation.

In terms of the COVID-19 recovery, the 4,942 projects included in the UNRR database were awarded by 229 funders – under half of which (107) have a portfolio that also comprises projects involving at least one LMIC. This can partially be explained by the fact that the UNRR portfolio of HIC-based funders contains a relatively small proportion of LMIC-focused projects.

Specifically, when examining the list of the most prominent research funders addressing the pillars and priorities of the UNRR, only one of the ten presented funders (in terms of number of projects) are an LMIC-based funder, namely the National Center for Scientific and Technical Research in Morocco (see Annex B). Of the remaining nine funders based in HICs, only 8.5% of their UNRR portfolio involve at least one LMIC – significantly lower than the proportion for the rest of the UNRR database (18.3%).

More widely, across all HIC-based funders, this proportion stands at 12.6%. Figure 3 illustrates this point further by highlighting the highest combined value of projects by funders (where the data is known) and how this varies when separating out projects across LMICs and HICs.

Figure 3 - Value of UNRR portfolio of HIC-based funders with largest known portfolios on tracker



Note for Figure 3: Financial information only available for 61.3% of all projects in entire database (39.5% for LMIC-focused projects). Individual research projects may take place across multiple countries and therefore multiple income classification groups.

3.3 INTERNATIONAL COLLABORATION

Of more than 16,000 projects in the Tracker being conducted in 157 countries, available data suggests that only 567 projects (3.5%) took place across multiple countries, thereby making them 'multi-country projects'. Although likely an underestimation, due to variability in reporting this level of detail, this does indicate low levels of 'multi-country projects' taking place during the pandemic. However, the data also suggests that projects taking place across multiple countries mostly involve at least one LMIC (63.3% of multi-country projects), as indicated in Table 2. Looking at collaborations across income groups, while Table 2 suggests that the most common type of cross-income group collaboration occurs between HICs and Middle-Income Countries (MICs), collaborations with the least developed and Low-Income Countries occurred more frequently with MICs rather than HICs.

Table 2 - Summary of types of multi-country collaborations*.

TYPE OF MULTI-COUNTRY COLLABORATION	NUMBER OF PROJECTS
Any multi-country collaboration	567
At least one LMIC	359
At least one LMIC and at least one HIC	208
At least one Least Developed and/or Low-Income Country and at least one HIC	56 (30 when excluding projects that also focus on a Middle-Income Country)
At least one MIC and at least one HIC	178 (152 when excluding projects that also focus on a least developed and/or Low-Income Country)
At least one least developed and/or low-income country and at least one MIC	104 (78 when excluding projects that also focus on a High-Income Country)

Note for Table 2: Emphasis has been placed on presenting the number of projects as opposed to amounts awarded by funders as financial information was only available for 61.3% of all projects in entire database (39.5% for LMIC-focused projects).

The top funders of the 567 multi-country projects are displayed in Table 3. Of these, 11 projects were pre-existing and explicitly repurposed for COVID-19 (although many more may have been linked to pre-existing funding). In total, 97 organisations have funded multi-country projects (which is reduced to 65 when only considering LMIC-focused research) and 88.7% of those are based in HICs. Across those funders with at least one multi-country project, on average, 53.4% of the portfolio is LMIC-focused. However, when only considering funders that have multi-country projects that involve at least one LMIC, the average proportion of the portfolio that is LMIC-focused increases to 79.7%.

Table 3 - Top ten funders of multi-country projects and LMIC-focused multi-country projects by number of projects

Funder	Number of Multi-Country Projects
UK Research and Innovation (UKRI)	87
European Commission	61
International Development Research Centre (IDRC)	40
Canadian Institutes of Health Research (CIHR)	29
Dept. Health and Social Care / National Institute for Health Research (DHSC/NIHR)	24
National Institutes of Health (NIH)	22
Sino-German Center for Research Promotion (SGC)	20
Wellcome	20
Agence Nationale de Recherche sur le Sida et les Hépatites Virale	15
European and Developing Countries Clinical Trials Partnership (EDCTP)	14
Volkswagen Stiftung	14
Funder	Number of LMIC-Focused Multi-Country Projects
UK Research and Innovation (UKRI)	63
International Development Research Centre (IDRC)	39
Canadian Institutes of Health Research (CIHR)	23
Dept. Health and Social Care / National Institute for Health Research (DHSC/NIHR)	20
Sino-German Center for Research Promotion (SGC)	19
Wellcome	19
Agence Nationale de Recherche sur le Sida et les Hépatites Virale	15
European and Developing Countries Clinical Trials Partnership (EDCTP)	13
European Commission	13
National Institutes of Health (NIH)	13

Table 4 - Top ten funders of multi-country projects and LMIC-focused multi-country projects by known funding amounts

Funder(s)	Known Value of Multi-Country Portfolio
National Institutes of Health (NIH)	\$279.2m
European Commission	\$47.3m
International Development Research Centre (IDRC)	\$26.3m
UK Research and Innovation (UKRI)	\$19.3m
Agence Française de Développement (AFD)	\$10.5m
Canadian Institutes of Health Research (CIHR)	\$10.5m
COVID-19 Therapeutics Accelerator (Wellcome / Bill & Melinda Gates Foundation)*	\$9.1m
UKRI / Dept. Health and Social Care / National Institute for Health Research (DHSC/NIHR)*	\$8.7m
Research Council of Norway	\$8.4m
Dept. Health and Social Care / National Institute for Health Research (DHSC/NIHR)	\$7.4m
Funder(s)	Known Value of LMIC-Focused Multi-Country Portfolio
National Institutes of Health (NIH)	\$160.1m
International Development Research Centre (IDRC)	\$25.5m
UK Research and Innovation (UKRI)	\$17.2m
European Commission	\$14.1m
Agence Française de Développement (AFD)	\$10.5m
COVID-19 Therapeutics Accelerator (Wellcome / Bill & Melinda Gates Foundation)*	\$9.1m
Canadian Institutes of Health Research (CIHR)	\$7.7m
Dept. Health and Social Care / National Institute for Health Research (DHSC/NIHR)	\$7.4m
European and Developing Countries Clinical Trials Partnership (EDCTP)	\$5.2m
Research Council of Norway	\$4.8m

Note for Table 4: Financial information available for 61.3% of all projects in entire database (39.5% for LMIC-focused projects). *Indicates co-funding between multiple organisations listed.

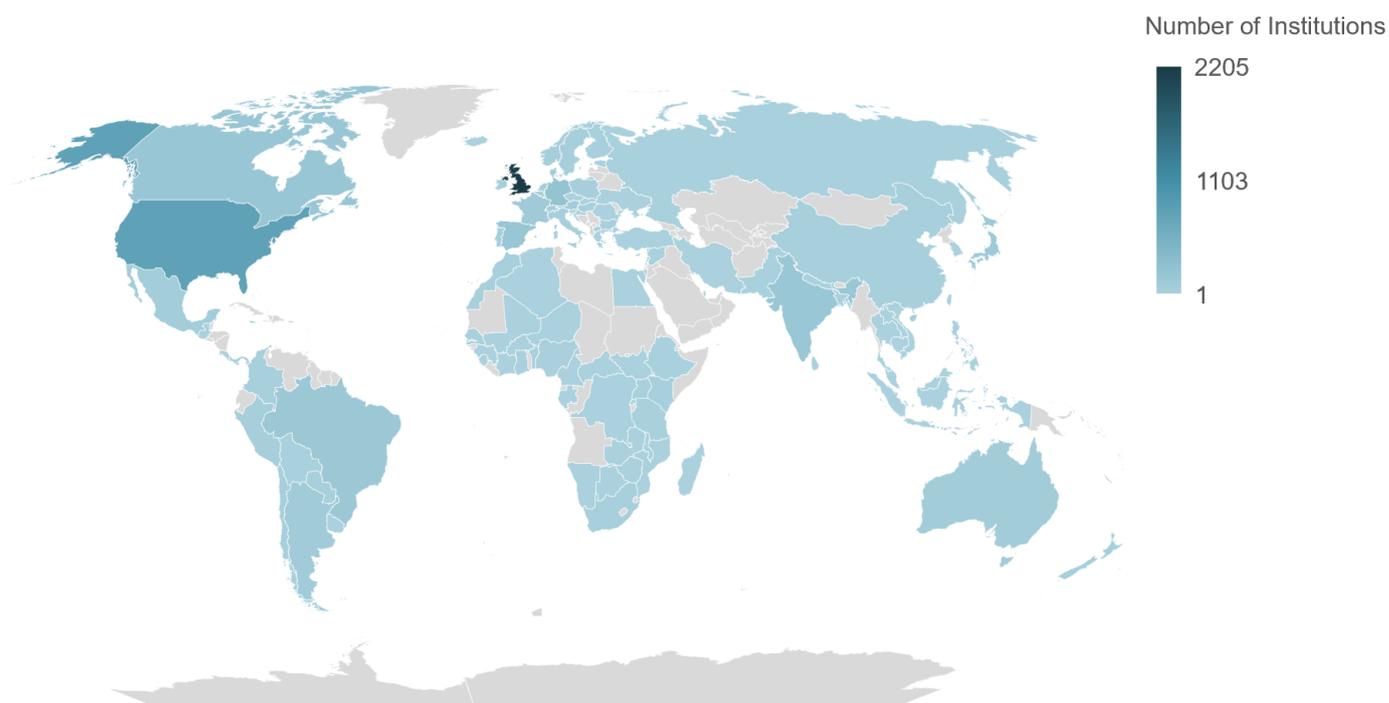
Reflecting on the UNRR portion of the database only, the list of funders presented in Tables 3 and 4 is largely consistent with those awarding the greatest number of multi-country projects within the whole database. In particular, the top funders of the multi-country projects for this subset of analysis were UKRI (42 projects), IDRC (32) and NIHR (14). The top funders of multi-country UNRR projects with at least one LMIC were IDRC (32), UKRI (32) and NRF South Africa (11), according to the database.

3.4 INSTITUTIONS

The 16,353 COVID-19 research projects under consideration for this analysis were awarded to 5,686 institutions based in 109 countries (Figure 4) – though institutional data was missing for 2,222 projects (13.6%).

While individual Canadian institutions ranked highly in terms of being designated as the ‘lead’ institution for the greatest number of projects (including six institutions in the top ten), lead institutions are more commonly located in the UK (2,205 institutions), the United States (802), Germany (236), and Spain (183). Overall, of the 5,686 institutions leading on COVID-19 research, only 914 (16.1%) are based in LMICs.

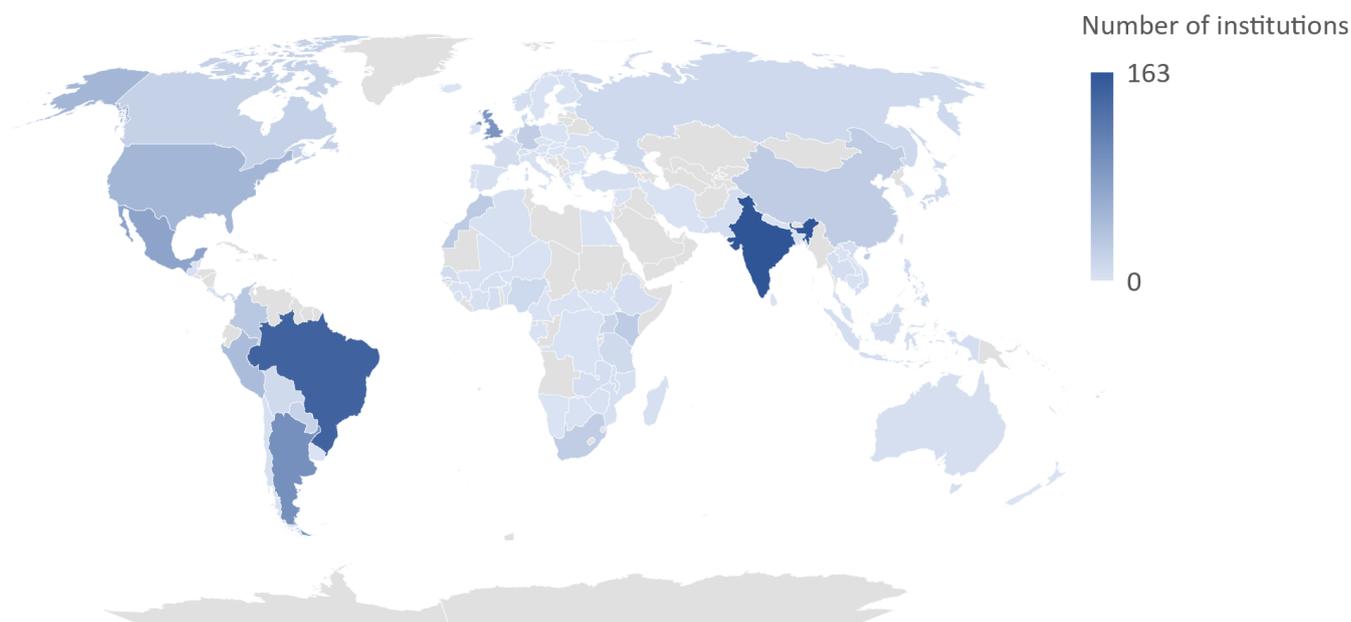
Figure 4 - Location of institutions leading on COVID-19 research



When only considering LMIC-focused research, a total of 1,157 institutions based in 88 countries were designated as the lead institution (Figure 5) – most commonly located in India (163 institutions) and Brazil (147). Furthermore, at an individual level, seven of the top ten institutions leading on the greatest number of LMIC-focused research projects are based in Brazil (including each of the top four).

While 267 of these institutions leading on LMIC-focused research are based in HICs, approximately one quarter of these institutions (24.3%) have led on more than one LMIC-focused project. On average, LMIC-focused research constituted 50.6% of the portfolio of a lead HIC institution that has led on at least one LMIC-focused project. This figure is reduced to 31.8% when only considering HIC institutions that have led on at least two LMIC-focused projects.

Figure 5 - Location of institutions leading on LMIC-focused COVID-19 research



3.5 RESEARCH PRIORITISATION

Since February 2022 the GloPID-R Research in LMICs Working Group on research prioritisation has focused its activities on reviewing the research priority-setting activities undertaken in response to the COVID-19 pandemic. Following a review of the multiple efforts to identify priority areas for research focus in response to the pandemic, the Working Group sought to identify key components of best practice for priority setting in preparedness and response to disease outbreaks, particularly relating to regional priority setting with an LMIC focus.

A series of Working Group consultation meetings, the development of a case study to showcase regional and global priority setting activities for COVID-19, and a survey of the GloPID-R membership and Clinical Trial networks resulted in the identification of eight key recommendations for developing and applying research priorities. These represent lessons learnt from the current pandemic response and funding during past diseases outbreaks.

The recommendations made relate to:

- **Transparency of processes involved in setting priorities**

This facilitates trust in the research agenda set and could enhance the uptake of priorities by funders, researchers, and policy-makers into practice. Transparency on the application of priorities in making research funding decisions should also be encouraged.

- **Rapid priority-setting activities**

The urgency of evidence required for promptly responding to epidemics and pandemics calls for expedited allocation of resources to research areas of the greatest need. Hence, to accelerate priority-setting processes in epidemics response mode, approaches such as prepositioning multistakeholder consultation groups in advance of the occurrence of epidemics/pandemic could be promoted.

- **Comprehensive methods**

Rigorous methods should be employed in the development of research agendas to improve the credibility of priorities identified.

- **Feedback loops**

Various stakeholders undertaking research prioritisation activities must build in feedback loops at the time of priority setting to enhance monitoring processes against research agendas.

- **Inclusivity and equity**

It is important that research priorities reflect the needs of their target populations. Therefore, processes for setting research priorities should be inclusive with respect to individuals/populations consulted to gain an understanding of the research needs during an epidemic/pandemic.

- **Funder policies**

Some challenges identified in the application of research priorities by funding organisations related to internal organisational policies that dictated the funding remit, timing of funding calls, and terms of funding awards, especially in LMICs. Flexibility of funders to adapt their policies in response to disease outbreaks was recommended as one approach to overcome this barrier.

- **Monitoring and evaluation**

Regular assessment of progress against research priorities is essential for identifying persistent research gaps, especially in a fast-moving pandemic where research needs are rapidly evolving. Promoting data sharing on funded projects and their outputs can also facilitate this process.

- **Communication**

This was recognised as a key element that should be encouraged during the entire process of developing research roadmaps. A clear purpose for priority-setting activities should be defined and well articulated, as should methods used to arrive at priority areas for focus. Similarly, research priorities set should be effectively communicated to promote their application in funding decisions.

3.6 FUNDERS' OWN EVALUATIONS

Both UKCDR and GloPID-R members were asked to provide any published evaluations relating to their response to the COVID-19 pandemic. The following four reports were sourced and analysed for any cross-cutting lessons identified.

Table 5 - Funder evaluations sourced from UKCDR and GloPID-R membership

SOURCE	TITLE AND LINK
Elrha	Five factors that make for successful research in a pandemic (35)
IDRC	Learning Report: Learning from responsiveness to a rapidly evolving context: IDRC's Covid-19 Responses for Equity programme (36)
IDRC	Positioning Research for Impact: Lessons from a funder during the Covid-19 pandemic (37)
UKRI	Process review of UKRI's research and innovation response to COVID-19. Final Report (38)

The analysis highlighted the following **challenges** to funding and conducting COVID-19 research:

- **Fast-changing nature of the pandemic**, and the consequent need to:
 - **Develop research very quickly** (quick turnaround for grants applications) and often having to wait a long time for grants application to be reviewed – for researchers;
 - **Process and assess funding applications very quickly** (causing heavy workloads for staff¹, dealing with regular grants application and management systems being unfit for such a quick turnaround and having to resort to 'manual' tools like spreadsheets and emails²) – for funders.
- Changing nature of the **policy responses** to the pandemic (i.e., short-notice changes to restrictions/lockdown rules), driven by a **highly unstable political and policy context** (i.e., pressured by media and public sentiment). This had the following notable consequences:
 - Limitations to access study populations – for researchers;
 - Old pathways for researchers and funders to influence policy were not necessarily in place anymore – for researchers and funders;

1. Large numbers of consultees for the UKRI study used terms such as 'exhaustion' and 'burnout' when describing the effect of staff having to process a high volume of applications so rapidly.

2. This meant a reduced availability of portfolio monitoring data (including EDI data) in the early and mid-stages of the COVID-19 response, which may have provided valuable evidence. The issue was solved when the regular system was brought back for the most part in August 2020.

- Researchers' and funders' policy engagement mechanisms had to adapt to the new context (i.e., from in-person to webinars, from lobbying decision-makers to raising awareness) – for researchers and funders;
- Difficulties in dealing with funding shortfalls and changes of political priorities – for government funders.
- **The complex and unprecedented nature of the 'COVID-19 response' complicated the definition of a strategic rationale for research funding.** While there were precedents for what constitutes an 'epidemic response' (i.e., based on previous epidemics such as Ebola and Zika), efforts to respond to the wider societal emergency (i.e., economic, societal, technological, and political implications) were unprecedented.
- **Compartmentalisation of work** occurring in all large development agencies, which limited their ability to invest in cross-division communication, networking, and knowledge sharing, which would be of primary importance in the case of a global-level emergency.
- **Trade-offs between the global scope** of COVID-19 research (given the global nature of the pandemic) and the need for stronger regional coordination and contextualisation (i.e., considering regional variations and specificities).
- **Gender** was not immediately understood as a **cross-cutting theme** across COVID-19 research. Moreover, even when it was recognised as a key lens to study the impact of the pandemic, not all research grantees were equipped to mainstream gender in their research approach. Funders could have played a more proactive role in framing gender as a research priority, as well as to set out the potential steps to make research more gender responsive.

The analysis also highlighted the following **success factors** of funding and conducting research during the COVID-19 pandemic:

- Funders allowed **flexibility around time and budget**, as studies often took longer than expected to deliver results, due to the uncertainties and difficulty of working in a global pandemic. This flexible approach was easier to implement for:
 - Funders whose strategy and budgets naturally aligned with priorities that emerged quickly with COVID-19³;
 - Funders with grant/application management systems that enable rapid design and setup of bespoke schemes with individually tailored application formats and assessment processes⁴.

3. This being said, going forward more options should be explored to allow this to happen also in cases where this alignment is lacking.
 4. Lack thereof was a major challenge for public sector funders (UKRI).

- Funders allowed **flexibility around study design, planning, objectives, methods, and thematic focus** of research. This was for two main reasons:
 - To allow researchers to respond to the fast-evolving pandemic scenario, and adapt data collection approaches to what was feasible in a specific context, at a specific time (i.e., shifting from in-person to online data collection);
 - To refine the conceptualisation and implementation of research projects on an iterative basis; research proposals were developed very quickly, and this flexibility to allow revisions made it possible to achieve better results (i.e., a broad thematic focus of funding calls enabled a rapid response, supporting adaptation to a fast-evolving context⁵).
- Researchers that were well-equipped (and/or well-networked) to **share data and findings with key audiences along the way**, not waiting until the end of the project – this positioning towards impact was mentioned as a priority for funders in future funding calls.
- To mitigate the risks given by the speed and scale of resources mobilisation, some **funders chose to issue closed calls targeted at well-established research partners** with proven systems to manage funds, as well as policy engagement capacities. The trusted relationship between funders and researchers allowed⁶:
 - More flexibility around time and budget;
 - More flexibility around study design, plan, objective, and methods;
 - Reliance on well-established policy engagement capacities.
- Funders were able to provide researchers with support to **mitigate the strain on operational partners** (i.e., key informant interviewees), whose ability to participate in the research process was limited. For example, providing research impact resources and guidance; providing suggestions for different types of products that could more easily be consumed; or facilitating joint engagement events that took less of the operational partners' overall time.
- Funders were able to build on **pre-existing investments (budget and time resources) in the creation of a solid network of Southern partner organisations** (i.e., grantees working at local, national, and global levels) and a prominent **role of regional offices to facilitate access to regional policy spaces**. This allowed the flexibility to provide grants to different types of project partnerships and consortia and explore new avenues for South-South knowledge sharing that proved to be key to the success of COVID-19 research in international development.

5. On the other hand, providing more guidance or framing for research themes, alongside clearer definitions, could have sharpened the focus of research and helped grantees to interpret and operationalise work in a more efficient way.

6. On the other hand, adopting this approach meant missing out on the innovations that would have arisen from engaging with new grantees.

The root of this success was in focusing on producing **contextually embedded research** (i.e., research produced with an in-country perspective), in conjunction with capacity building for policy influence at a regional level (i.e., country-specific stakeholders).

- Funders set research priorities in line with the needs of those most impacted by the socioeconomic consequences of the pandemic, ensuring that citizens' and community voices are part of, and are reflected in, the research and policy recommendations. This was achieved through partnerships between researchers and civil society groups, **connecting community-based needs and government action**.
- Funders facilitated the existence of spaces and initiatives for **peer learning and knowledge exchange among grantees**. This sharing exercise informed adaptations and innovations in the research process that led to successful results. Active participation requires time, energy, and financial commitments from grantees; for this reason, funders' support is key.
- Some funders were able to **overcome compartmentalised work** and invest in cross-division communication/cross-council work (in the case of UKRI) through the establishment of a central coordination group with substantial decision-making power. This allowed a consideration of the complexity of the **response that COVID-19 required across different disciplinary areas**.

4. LESSONS LEARNT ON ENABLERS AND CHALLENGES TO FULFILLING THE SEVEN FUNDER PRINCIPLES

Enablers and challenges to effective research during the first year for the COVID-19 response have been elucidated through the COVID CIRCLE surveys and stakeholder consultations, and they are here mapped against the COVID CIRCLE Funder Principles with associated potential solutions. Cross-cutting enablers and challenges are presented at the end of this section.

Timeliness is one of the most important factors in the response to epidemics and pandemics and many of the barriers highlighted are related to this factor. Several of the solutions cut across multiple principles and are presented at the end. Evidence relating to certain principles (in particular 'partnerships' and 'protection from harm') will require further collation beyond the timeline of this review.

4.1 ALIGNMENT TO GLOBAL RESEARCH AGENDAS AND LOCALLY IDENTIFIED PRIORITIES- ENABLERS & CHALLENGES

1. Alignment to global research agendas and locally identified priorities:

To consider global research priorities, such as proposed by the [WHO](#) and other multilateral entities or regional bodies such as the African Union, as well as local research priorities, in addition to funder strategic priorities, when funding research for global benefit. The WHO R&D Blueprint was developed to help guide the research response for epidemics and pandemics and alignment with this and associated research roadmaps developed for a coordinated response focuses the funds available. It is recognised that certain global research priorities (or additional priorities) may be of particular relevance for research in resource-limited settings and consideration of locally identified priorities should also be reflected in the funding process. *For COVID-19 the WHO Research Roadmap for COVID-19 has been developed by the WHO R&D Blueprint team building on consensus from global researchers to help guide the research response for COVID-19.*

4.1.1 AVAILABILITY OF RESEARCH AGENDAS AND CAPACITY FOR PRIORITY SETTING

The WHO has led the global response to the COVID-19 pandemic with the prompt triggering of its R&D Blueprint mechanism. Through a collaborative meeting between the WHO and GloPID-R (14 – 15 February 2020), key research priorities were identified rapidly. This roadmap facilitated funders and researchers to closely align their activities to the areas of greatest research need. The timely availability of the WHO Research Roadmap was viewed as key to enabling funders to align their responses to it.

LMIC-based stakeholder perspectives were incorporated into the WHO Research Roadmap through the in-person consultations and supplemented by collaborative exercises (including the effort between The Global Health Network, COVID CIRCLE and the African Academy of Sciences) (39). Delayed development or absence of regional research priorities was a clear barrier for alignment. A regional set of priorities was developed through an all-of-Africa approach led by the Africa Centres for Disease Control and Prevention, African Academy of Sciences, WHO Regional Office for Africa, and the African Union Development Agency, resulting in a consolidated regional research agenda (40). Other regions, however, did not develop research agendas for COVID-19 which align with local needs.

The shift to virtual global meetings has provided greater opportunity for LMIC participation in multilateral research agenda updates. Open access to research outputs has further improved the update of research agendas. The more recent efforts to develop these changes need to be built on and both GloPID-R and UKCDR can play a role in ensuring these meet their respective funder audiences.

For future epidemics and pandemics, research agendas from WHO and/or other advisory/funding agencies need to be aligned and adapted to the local research needs of LMICs. The articulation of the needs and gaps, and strategies to address these, should be led by LMICs rather than being directed by external stakeholders.

GloPID-R's work with its Research for LMICs Working Group on research prioritisation highlight some key areas of best practice to be considered by funders and wider stakeholders in the development of research priority agendas and their effective application for decision-making in response to future epidemics and pandemics.

4.1.2 PARTNERSHIPS & STAKEHOLDER ENGAGEMENT

Harnessing existing partnerships and networks with in-depth contextual knowledge enabled the identification of local priorities, including those unique to vulnerable groups such as refugee and migrant populations. Engaging local and regional stakeholders in research priority setting ensured on-the-ground knowledge was factored into research, particularly in the identification of evolving local and regional priorities.

However, a major gap for funders was the lack of information regarding the local needs and gaps based on different regions. Establishing geographical hubs led by LMICs (which GloPID-R is currently piloting) will address this gap and be key for preparedness. Such hubs will enable understandings of local funding landscapes and potentially facilitate interactions with regional research and policy organisations. Funders also stated a barrier to funding LMIC research priorities was the shortage of appropriate reviewers.

The GloPID-R regional hub in Asia-Pacific (hosted by the KRIBB and NRF) has already undertaken regional mapping of local funders and stakeholders to build a funders network (with 464 research funders identified using five databases) and is now undertaking regional meetings to strengthen these links. The GloPID-R regional hub in Africa (hosted by SA MRC) is also now undertaking regional mapping, supported by existing regional networks such as the African funders forum and in collaboration with regional bodies such as African CDC.

4.2 RESEARCH CAPACITY FOR RAPID RESEARCH - ENABLERS & CHALLENGES

2. Research capacity for rapid research:

a. To build upon existing research capacity and systems, where available.

For research to inform the health, economic and social policy and public health response in an ongoing epidemic or pandemic (or future outbreaks of the same pathogen), it needs to be implemented as rapidly as possible. Funders recognise that building on existing research capacity and systems is the fastest way to ensure high quality research is conducted and knowledge exchanged and that the long-term impacts of epidemics and recovery are addressed. Incorporation of epidemics-relevant research questions into existing research studies (for example cohorts and clinical research networks) will be encouraged where possible, applicable and appropriate, to gain benefits from

both rapid research activation, knowledge mobilisation and pre-existing relevant data.

b. To support capacity strengthening necessary for the research.

Funders recognise the need for strengthening research capacity, particularly in resource limited settings and will consider the sustainability of any newly funded research capacity and whether it could be embedded for rapid activation in future outbreaks. Relevant guidance is provided by the work of the ESSENCE Group, including the ESSENCE Good Practice Document on Capacity Strengthening.

4.2.1 RAPID RESPONSE & SUSTAINABLE FUNDING

To generate urgently needed evidence in response to the pandemic, rapid response funding calls were launched. Several approaches were taken by funders to ensure initiation of rapid research, including: supplementing existing grants, pivoting on-going research to COVID-19, and expediting proposal review and funding processes (specific examples are given in the case studies). These approaches were particularly effective where funders had pre-positioned strategies for responding to emergencies.

The EDCTP and R2HC rapid research funding calls are examples of how funders promptly adapted existing, tested emergency research funding methodologies for the response to COVID-19. Prior experience and lessons drawn from the funding of previous emergencies including the West Africa Ebola (2014 – 2016) and North Kivu Ebola (2018) outbreaks contributed to the success of the rapid funding mechanisms initiated. Both funders modified their established funding processes to allow for expedited proposal review and commencement of research in advance contracting which facilitated rapid initiation of research. In the case of EDCTP, another success factor was the designation of contingency funding for research in preparedness for an outbreak response which could be swiftly mobilised in response to the pandemic.

However, funders identified the challenge of ensuring quality was not compromised in rapid research, particularly with respect to maintenance of research rigor and adherence to ethical standards. Further, shortages of appropriate reviewers and delayed ethical approvals due to insufficient capacity in local LMIC Institutional Review Boards also prohibited rapid research. The demand for researchers with expertise in particular disciplines in LMICs outstripped supply, further inhibiting rapid research in some fields, pointing to the need for further individual research capacity strengthening.

Where there was availability of previous or existing local and institutional sources of funding, researchers were able to rapidly mobilise a research response, particularly where established, trusted and effective working relationships were already in place, along with existing staff capacity. Many researchers encountered challenges in obtaining funding for COVID-19 research in LMICs during the pandemic and were reliant on funding already in place for other research to initiate new COVID-19 research activities. Many pre-existing projects had to submit new proposals during the COVID-19 pandemic, causing unnecessary bureaucracy in cases where researchers were already

set up to conduct the research needed. Researchers specifically pointed to the lack of funding for sustained collaboration that could have been pivoted to COVID-19. The lack of fora and regional networks was also identified as a barrier. In some cases, researcher-related delays resulted from the grant application processes where, for instance, there were delays in responding to funder enquiries on proposed research or other administrative queries relating to financial checks. Here, a well structured organisational set up in research offices, particularly in LMICs, could address this.

4.2.2 FUNDER POLICIES & ACCOUNTABILITY

Funding new research involves complex processes and differing accountabilities (e.g. to governmental or charity laws) which contributed to delays in both funder and researcher activities and, in effect, delayed rapid initiation of research. Although many funders modified their funding policies to facilitate rapid funding decision-making, some challenges related to disbursement of funding were identified. Bureaucratic processes involved in administering funds, particularly to LMIC-based partners, and lengthy contracting and due diligence processes often delayed rapid research funding and may have led to limited funding of projects involving LMIC researchers. Finding independent reviewers to review funding decisions was also recognised as a barrier in funding LMIC institutions.

Funders are accountable for public funds and need to balance rapid funding against inherent accountability which can contribute to delays in rapid research. A potential approach to addressing this challenge involves empowering funders to take emergency decisions in advance of emergencies/crises. Through these laid down policies and procedures, funders can override contract law to speed up funding allocation in emergencies such as the COVID-19 pandemic.

4.2.3 CAPACITY STRENGTHENING

Individual research capacity strengthening through training and leadership among LMIC researchers is a continuing need, to provide a broad base of researchers to respond to epidemics and pandemics.

Sustainable funding and the supplementation of existing, successful networks (with prior funding arrangements), rather than setting up new partnerships, were also identified as ways to prevent delays. Such networks need sustainable funding between epidemics to build capacity and partnerships with academic stakeholders and, importantly, policy stakeholders across LMICs (without needing to competitively e-apply). Further, preparedness planning should include the provision of contingency funding for such epidemics research groups in order that resourcing decisions can be made at their level to expedite research in the event of an outbreak.

4.3 SUPPORTING EQUITABLE, INCLUSIVE, INTERDISCIPLINARY AND CROSS-SECTORAL PARTNERSHIPS - ENABLERS & CHALLENGES

3. Supporting equitable, inclusive, cross-sectoral and interdisciplinary partnerships

a. To support equitable partnership throughout the research process.

Equitable partnerships are needed to ensure successful, embedded research, which is locally relevant. Partnerships supported should be informed by relevant guidance such as UKCDR and ESSENCE's Four Approaches to Supporting Equitable Research Partnerships; COHRED's Research Fairness Initiative and Fair Research Contracting, and the Commission for Research Partnerships with Developing Countries' (KFPE) 11 Principles for Research Partnership. *Funders may additionally support the aspiration that any new vaccines, diagnostics, and treatments developed for COVID-19 are globally available, appropriate, and affordable, regardless of where they have been developed or who has funded them, aligned with the Global Collaboration ACT Accelerator.*

b. To promote inclusive and cross-sectoral partnerships to ensure that research is most likely to impact policy and practice.

Inclusivity is needed to ensure consideration of vulnerable or marginalised groups in the research agenda. Public and community engagement plays a particularly important role in achieving and maintaining trust for research within communities for research during outbreaks, informed by guidelines such as the [UNAIDS Good Participatory Practice Guidelines for Biomedical HIV prevention Trials](#). Research partnerships should demonstrate that community and public engagement has taken place and will continue to do so. Cross-sectoral partnerships across communities, government, public health and non-governmental organisations all help to ensure that the research funded is most likely to impact policy and practice for the relevant government and public health organisations.

c. To promote interdisciplinary research.

The importance of interdisciplinary partnerships for relevant and effective research in epidemics has been highlighted, including through the joint work of the UK Academy of Medical Sciences, UK Medical Research Council and InterAcademy Partnership.

4.3.1 INCLUSIVITY & INTERDISCIPLINARITY

Examples of best practice for inclusivity involved engaging research partners with local expertise, which ensured that 'voices from the ground' were heard. This promoted the inclusion of marginalised and vulnerable groups and ensured their unique research priorities were factored into research.

For an effective response to the COVID-19 pandemic, a wide breadth of interdisciplinary research was crucial for gaining insights into various aspects of the disease and its impacts. Interdisciplinary partnerships promote the generation of rich research evidence,

uptake of research outputs, and policy change. However, in some cases, these partnerships are still perceived as taking place between the various biomedical disciplines, with limited or no involvement of the social sciences, and thus constituted a challenge to interdisciplinary research. The data from the COVID-19 Funded Research Project Tracker, however, indicates some level of partnership with social sciences research and other disciplines, with 8.3% of projects categorised against one of the seven medical research priorities areas and either ethics or social sciences (see Annex B).

4.3.2 EQUITY

Some funders and researchers recognised that short timelines for the development of novel research projects during the pandemic limited ability to set up truly equitable partnerships, for example, there was limited funding or time for partnership development and difficulty connecting with partners. Again, pre-existing partnerships with established trust were more likely to result in equity (e.g., ISARIC and MORU Clinical Care Asia Network). Networking, webinars and opportunities for researchers to communicate and engage were viewed as enablers with an emphasis on co-creation and shared ownership of resources. Issues with equity in access to the products of research is covered in Section 3.6.

In partnership with ESSENCE, UKCDR recently created [detailed guidance](#) on how notions of equitable research partnerships may be applied in multi-country research consortia and partnerships. Drawing on the experiences of funders, research organisations, and researchers, the guidance highlights barriers to implementing equitable partnerships and provides recommendations on how these may be overcome (41).

4.4 OPEN SCIENCE & DATA SHARING - ENABLERS & CHALLENGES

4. Open science and data sharing: To require that research findings and data relevant to the epidemic are shared rapidly and openly to inform the public health response. Rapid research findings, data sharing and open access publishing can accelerate health benefits through: facilitating research projects; reducing the duplication of work; and ensuring a clearer picture of the disease through pooled results to improve intervention effectiveness. Funders will be informed by relevant guidance such as the [GloPID-R Roadmap for Data Sharing](#) (in particular, the guidance on grant conditions requiring rapid sharing of quality assured data and development and review of data management plans in alignment with the FAIR Guiding Principles for scientific data management and stewardship) as well as the associated GloPID-R Principles of Data Sharing in Public Health Emergencies (Timely, Ethical, Accessible, Transparent, Equitable, Fair, Quality). *For COVID-19 the joint statement on Sharing research data and findings relevant to the novel coronavirus (COVID-19) outbreak is pertinent.*

4.4.1 POLICIES INTO PRACTICE

Existing data sharing initiatives and best practice guidance (such as the GloPID-R Data Sharing Roadmap) were perceived to have influenced data sharing practices in response to the pandemic. Data sharing agreements built into equitable partnerships also encouraged data sharing. Some examples of best practice related to data sharing are detailed in the Annexed Case Studies relating to 'ICODA' and 'afrimap'. However, implementation was impaired by limited awareness of existing policies, lack of clarity on optimal requirements for data sharing (for the various types of research), and a lack of standardisation of data sharing requirements among funders and researchers. The limited experience of some funders and researchers with data sharing and in-country legal prohibitions contributed to data sharing hesitancy and was thus a significant challenge to adherence to best practice.

To counteract this, the COVID CIRCLE Researcher Platform was launched in February 2021 to facilitate information sharing and bring together the global research community working on COVID-19 research, in and for low-resource settings. The COVID-19 resource hub acts as a repository for relevant papers, guidance, news, and events on a myriad of topics, including data sharing and open science. In addition, a community of practice was developed to support UK-funded researchers working in or with LMICs (from UKRI, Wellcome, UK DHSC and FCDO-funded schemes) to connect and collaborate, share resources, and identify research synergies and opportunities for multidisciplinary and international collaboration. Quarterly webinar events have been hosted to bring together the community of practice, including an event jointly hosted by UKCDR and the COVID-19 Clinical Research Coalition Data Sharing Working Group. As with other COVID CIRCLE quarterly webinars, this event created an opportunity for the respective research communities to share their findings and experiences, in this case related to overcoming barriers to data sharing, whilst providing a space for networking and mutual learning. Researchers from the community have particularly valued the community events and the signposting to relevant resources, networks, and groups within the digital community hub.

4.4.2 INFRASTRUCTURE AND CAPACITY

Internet access and access to databases enabled adherence to the data sharing principle, particularly by LMIC researchers. Conversely, limited capacity in LMICs to adhere to data sharing requirements was identified as an important challenge to conducting effective research, especially regarding meeting data storage requirements. Poor data quality and lack of standardisation were continued issues observed by researchers, alongside hesitancy in sharing clinical data, or data secrecy. This was further worsened by inadequate funder support, for instance, in regard to the provision of specific funding for technical support for data sharing and outlining optimal requirements.

A lack of standardised infrastructure resulted in the proliferation of data platforms being used with limited inter-linkage. This was compounded by another barrier; namely, that data is already kept separately in different sectors, creating issues with standardisation and linkage.

4.4.3 RESEARCH UPTAKE

Funders identified the need for open science to explicitly support research uptake through putting greater focus on ensuring that data is shared in a useable format for different audiences, including decision-makers and policy-makers.

4.5 PROTECTION FROM HARM - ENABLERS & CHALLENGES

5. Protection from harm: To take all reasonable steps to anticipate, mitigate and address harm to those involved with research funded. Everyone involved in the research chain, from research funders, planners and practitioners to local community members, has the right to be safe from harm. Funders working in international development research will be informed by guidance such as [UKCDR's guidance on safeguarding in international development research](#). For COVID-19 there is a companion piece on practical application of the UKCDR safeguarding guidance during COVID-19.

4.5.1 MONITORING COMPLIANCE

The availability of Standard Operating Protocols (SOPs) for research, safeguarding guidance and ethical standards were enablers to practising the protection from harm principle. The requirement of research projects to undergo ethics review also promoted adherence to safeguarding guidance, although monitoring compliance following the award of grants was identified as an important challenge. Here, there is a need to balance regular monitoring of grantees with allowing sufficient time for undertaking research.

4.5.2 INFECTION PREVENTION & CONTROL

Conducting research during a pandemic presents unique risks of potential harm to researchers and research participants. Here, the increased risk of COVID-19 transmission is of importance. Innovative methods for conducting research while maintaining social distancing, remote activities which prevent face-to-face contact (where feasible), and adherence to other infection and prevention control measures have been crucial for protection from harm. Regular PCR testing (among research teams) and personal protective equipment use were also identified as enablers to effective research. However, severe personal protective equipment shortages represented a challenge to protection from harm and were exacerbated in LMIC settings.

4.6 APPROPRIATE ETHICAL CONSIDERATION - ENABLERS & CHALLENGES

6. Appropriate ethical consideration: To ensure appropriate ethical consideration is embedded throughout research conducted, in particular regarding access to the products of research. Ethics should be at the heart of funding decision-making and considered throughout the research, including informing approaches to ensure that the optimal value is being obtained from the research for all parties involved. Relevant guidance is provided by the Declaration of Helsinki International Ethical Guidelines for Health-related research involving humans by the Council for International Organizations of Medical Sciences (CIOMS) , Nuffield Bioethics for public health emergencies – recommendations and The Global Code of Conduct for Research in Resource-Poor Settings. *For COVID-19 the WHO Ethical Standards for research During Public Health emergencies: Distilling Existing Guidance to Support COVID-19 R&D is pertinent.*

4.6.1 RAPID REVIEW

A major consideration for rapid research is ensuring rapid ethics reviews do not compromise research quality. The availability of WHO ethics guidelines specific to COVID-19 (42) was viewed as an enabler to best practice. Rapid ethics reviews were facilitated by the formation of COVID-19-specific ethics review boards outlining processes for expedited review of projects with existing ethical review board (ERB) approvals. Collaboration with local research partners with expertise in local ethics review processes was identified as a key enabler for ensuring contextually appropriate ethical considerations. Several factors contributed to delayed ethics approvals, including limited capacity, which was exacerbated by bureaucratic processes and, in some instances, a lack of standardised ethics guidelines for COVID-19 research.

4.6.2 IP & DATA RIGHTS

Intellectual Property (IP) and data rights were viewed as major barriers to equity in research and to access to the products of research in LMIC contexts. The GloPID-R Scientific Advisory Group (SAG) report (43) has already identified this as a key area for members to determine how funders can rethink their guidance and influence going forwards. The report highlights the needs to explore 'new conceptions of IP, technology transfer, and data sovereignty that better produce social goods than the current patent/trademark/copyright/trade-secrets system'. This work will be explored through the GloPID-R data sharing working group.

4.7 COLLABORATION AND LEARNING THROUGH ENHANCED COORDINATION - ENABLERS AND CHALLENGES

7. Collaboration and learning enhanced through coordination:

To ensure maximum impact of investments for research on the most pressing global needs for epidemics through cross-funder and cross-researcher collaboration, learning and evaluation.

- a. **To map research funded, use these data to enhance coordination, and ensure it is publicly available.** Maximising the value of research investments requires accessible, comprehensive and coherent information on what and where others are investing to help identify funding gaps or duplication and inform or direct future investments. Research funded needs to be mapped publicly, for example through the World Report. *For COVID-19 the COVID-19 Research Project Tracker by UKCDR & GLOPID-R is pertinent. The Research Project Tracker is aligned with the WHO Research Roadmap for COVID-19 to facilitate informed decision-making and targeting of funds where there is need.*
- b. **To foster collaboration between studies funded in epidemics and facilitate shared development of research protocols, data collection tools, data sharing and exchange of knowledge.** Collaboration between researcher communities can facilitate trust, foster new partnerships and improve research outcomes and their impact. Where relevant, funded researchers will be supported to embed in relevant or, co-create communities of practice or an equivalent that promote shared development of research protocols, data collection, purpose driven data and results sharing.
- c. **Where relevant, to embed operational research and support impact evaluation across funded projects to learn from and improve future funder and researcher responses for epidemics.** Conducting research during epidemics is still a relatively new endeavour and it is important to embed operational research (research on research) and impact evaluation where relevant. In particular, this should aim to identify how the research response can be improved, including how to overcome barriers to achieving the Funder Principles outlined here (building on prior work undertaken by GloPID-R and GOARN Research such as the PEARLES review and GloPID-R Roadmap for Data Sharing)

4.7.1 RESEARCH MAPPING

The COVID CIRCLE initiative has aimed to strengthen the coherence of the COVID-19 research response and facilitate coordination and collaboration among funders and researchers. In particular, mapping and analysis of projects captured in the UKCDR & GloPID-R COVID-19 Funded Research Project Tracker has enabled the identification of research gaps and opportunities for collaboration. Many funders reported having used the Tracker to support strategy review, funding call specifications, and funding

decisions during the pandemic. The benefits were seen in the transparency regarding what is being funded, identification of the gaps, and mapping to the WHO Roadmap.

Funders and researchers identified that it is also important to track other factors relevant to research quality, including capacity strengthening and the equity of research partnerships involving LMICs. The visibility of capacity is essential to ensure researchers are aware of what capacity is available and how they can collaborate. Various efforts such as those undertaken by the Global Health Network, the African Academy of Sciences, and ESSENCE on Health Research are mapping capacity, but these could be strengthened.

GloPID-R and UKCDR are now continuing to work together to launch the Pandemic Preparedness: Analytical Capacity and Funding Tracking programme (Pandemic PACT). This initiative aims to develop a tool with an associated research team collating and analysing relevant global funding data for a wide range of epidemic-prone diseases to inform effective funding decision-making. The programme will support the coordination of research preparedness and research responses during new epidemics and pandemics (especially across LMICs).

4.7.2 CONVENING

Virtual conferencing during the pandemic has greatly enhanced global convening. The WHO Blueprint has shown positive convening power, bringing together 10,000 people in its last research agenda priority setting meeting. GloPID-R has also convened a range of successful Synergies meetings with global participation on Vaccines,

Therapeutics, Transmission, Social Sciences Research, Long COVID and Research in LMICs (44, 45, 46, 2). A remaining challenge is how to translate such convening into greater and more effective collaboration.

4.7.3 PROMOTING COLLABORATION

Existing partnerships and networks which promoted the exchange of ideas, data sharing, and dissemination of research outputs were identified as enablers of effective research, although insufficient investment to sustain these partnerships was identified as a challenge. Further, the lack of key collaborative networks in Southeast Asia, similar to that provided by the Africa CDC for example, was a challenge to coordination and collaboration. The move to virtual events following COVID-19 travel restrictions encouraged greater participation and engagement in COVID-19 related research conferences and meetings.

Funders identified that 'how they fund' could be improved to support collaboration. The issue of large numbers of trials and trial networks was viewed as one that funders could and should address, to ensure that prioritised research questions can be answered in the most efficient and effective way, particularly in LMICs. This is especially pertinent as many of these small trials have resulted in underpowered studies unable to meet their aims. Funder collaboration to promote and ensure fewer and more efficient trials was sought and aligns with the recent G7 Clinical Trials Charter (47).

GloPID-R has now reformed its Clinical Trials Working Group (48), which has worked to develop a Living Roadmap for Clinical Trial Coordination that is underpinned by 11 principles and three goals (to be published in January 2023). These are complementary to the principles within this report as they focus on both preparedness and response areas for funders, relating specifically to improved coordination of clinical trials funding. Recommended actions for funders to adhere to these principles are provided in the report and during January 2023 the GloPID-R Working Group will develop an implementation guide to agree immediate steps that funders will take to implement these.

The GECO case study (Annex A) highlights the development of the COVID CIRCLE Researcher platform specifically to support their community of researchers undertaking COVID-19 research across LMICs to collaborate (along with researchers funded by other UK-based calls). Activities on this platform are aimed at facilitating the translation of research into policy and practice.

Improved collaboration across research funding and public health funding was also identified as an enduring challenge, with some national funders able to cover both but increased linkage and highlighting of gaps needed.

4.8 CROSS-CUTTING ENABLERS AND CHALLENGES AND THOSE IDENTIFIED BEYOND THE FUNDER PRINCIPLES

4.8.1 CROSS CUTTING BARRIERS

Timeliness and availability of funds were perhaps unsurprisingly the main cross-cutting barriers identified by both funders and researchers during the pandemic. For researchers, all aspects of setting up new high-quality research projects were more challenging both due to the pandemic and in partnerships in LMICs. For funders, governance (including bureaucracy) and political issues were key cross-cutting barriers to applying the Funder Principles.

Analysis of funding captured in the UKCDR & GloPID-R COVID-19 Funded Research Project Tracker showed limited international and interdisciplinary projects and the huge proliferation of small national-based projects. It also showed that many funding calls were time-limited and there was not sustained funding activity throughout the first year of the pandemic.

4.8.2 CROSS CUTTING ENABLERS

Pre-existing arrangements, including funding mechanisms, funding relationships, and research networks and collaborations, were identified as key enablers to ensuring an effective research response to the COVID-19 pandemic in alignment with the Funder Principles. The need to build partnerships during inter-epidemic periods was therefore seen as key. Visibility of these partnerships was also seen as a key enabler, with both research capacity and research activity mapping viewed as important for this.

Whilst many pieces of good policy guidance exist (as referenced in the Funder Principles), guidance on applying best practice now needs to be developed to strengthen the implementation of the principles and recommendations in this report, incorporating the lessons learned. Guidance for implementation on practice across the principles could improve research generally beyond epidemics and pandemics. This would then be more likely to result in 'high-quality research for the most pressing global needs' for future epidemics and pandemics. As detailed above, both UKCDR (Equitable partnerships) and GloPID-R (Research prioritisation and Coordination of Clinical Trials) have now worked towards this in several key areas.

5. RECOMMENDATIONS FOR RESEARCH FUNDERS

The challenges and potential solutions outlined to achieving the Funder Principles require action from a range of stakeholders. Highlighted here are the recommendations on the actions that funders could pursue either individually or collectively. These build from the greater detail provided on enablers and challenges to implementing the Funder Principles (Section 4), the analysis of the first year of the COVID-19 research funding response (Section 3) and the case studies (Annex A). Key recommendations include the need for: greater long-term funding of networks that provide the capacity to pivot to emerging diseases; the need for greater guidance, support and systems to realise Open Science; and greater global coordination including joint funding mechanisms.

5.1 RECOMMENDATIONS TO FUNDERS FOR ACTION

1. Alignment to global research agendas and locally identified priorities

- a. Support for the development and strengthening of research networks involving local funders in advance of future pandemics, to facilitate leadership for regional and local research priority setting, and adaptation of priorities and sub-priorities from WHO and/or other advisory agencies for local needs of LMICs through GloPID-R regional hubs.
- b. Provide agile mechanisms for dedicated funding or direct funding to LMICS to match their research needs for epidemics and pandemics.

2. Research capacity for rapid research

- a. Ensure sustained funding for building research capacity between epidemics and pandemics (including highly trained researchers through training, including

<p>leadership training and small grants for early researchers), linked with public health capacity building (including surveillance), clinical trial and research platforms, and national clinical data systems (where available). These can then be built on and linked by rapid response supplemental funding.</p>
<p>b. Funder coordination to rethink the proposal review process during emergencies through a risk-based approach.</p>
<p>c. Introduce funder policies which outline governance to override normal funding processes in emergency situations. Test these funding mechanisms during peace time to leverage them during emergencies.</p>
<p>3. Equitable, inclusive, cross-sectoral and interdisciplinary partnerships</p>
<p>a. Increase emphasis on interdisciplinary research for epidemics involving LMICs.</p>
<p>b. Increase HIC funder activity on epidemic research in least developed and Low-Income Countries in recognition that supporting HIC research gaps alone does not end a pandemic.</p>
<p>4. Open science and data sharing</p>
<p>a. Raise awareness among funders and reviewers of the advantages of the open-science approach for epidemics and pandemics and existing initiatives and policy guidance.</p>
<p>b. Develop clear consistent data management and sharing guidelines across funders working with the research community, for rapid data sharing for different kinds of research (i.e., for biomedical research versus social sciences research) within epidemics and pandemics in alignment with the GloPID-R Data Sharing Roadmap.</p>
<p>c. Provide guidance and funding to support with data sharing during epidemics or pandemics, e.g., set up of data sharing platforms in advance.</p>
<p>d. Evaluate the implementation and impact of open science during COVID-19.</p>
<p>5. Protection from harm</p>
<p>a. Specific funding allocation for personal protective equipment (PPE) training and other infection prevention and control (IPC) measures for those involved in the research process.</p>
<p>6. Appropriate Ethical Consideration</p>
<p>a. Removal of operational bottlenecks to speed up ethics review process in emergencies.</p>
<p>b. Increased research activity to explore ethical dilemmas in epidemics specifically in LMICs.</p>

7. Collaboration and learning enhanced through coordination

- a. Provide funding for repurposing or extending existing partnerships, collaboration networks or coordination mechanisms.
- b. Enhanced collaboration between funders – possible coordinated or joint international funding calls to improve funding efficiency.
- c. Learn from existing rapid funding mechanisms (see case studies on R2HC and EDCTP) and those funders who developed rapid funding for COVID-19 (e.g., UKRI and CIHR rolling calls).

8. Cross-cutting

- a. Develop guidelines for “operationalising” the seven Funder Principles.
- b. Embed application of the seven Funder Principles in the entire funding process.
- c. Launch joint or coordinated funding calls to enable international research partnerships beyond individual funder remits through a GloPID-R mechanism.
- d. Provide funding for diverse types of research, e.g., health systems research funding, applied research, implementation science, and cohort studies.
- e. Develop guidance for funders to support research uptake within the timescales of an epidemic.
- f. Share information on funded projects including funding amounts.

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