COVID CIRCLE
COORDINATION · RESEARCH · LEARNING

Annexes for the report
Funding and undertaking research during the first two years of the COVID-19 pandemic
COVID CIRCLE lessons for funders

January 2023

GLOPID-R

UKCDR
UK Collaborative on Development Research

ANNEXES

ANNEX A. CASE STUDIES

Find the case studies on the UKCDR website:

https://www.ukcdr.org.uk/resource/case-studies-funding-and-undertaking-research-during-the-first-two-years-of-the-covid-19-pandemic/

INTRODUCTION

As part of the COVID CIRCLE initiative, the COVID-19 Research Project Tracker by UKCDR and GloPID-R is a live database of research projects funded in response to the global pandemic. By providing an overview of research projects mapped against the priorities identified by the WHO (in their Coordinated Global Research Roadmap on COVID-19 published in February 2020), as well as the pillars identified by the UN (in their Research Roadmap for the COVID-19 Recovery published in November 2020), the tracker has supported funders and researchers to deliver a more effective and coherent global research response. Since its launch in April 2020, the tracker contains more than 16 thousand projects worth more than $6.2 billion from over 300 funders around the world and has been viewed close to 40 thousand times.

As part of the ongoing efforts by COVID CIRCLE to enhance the effectiveness and coherence of the global research response to the pandemic, this analysis makes use of the April 2022 version of the tracker to understand how the research response has evolved in the two years since the launch of the tracker, thereby providing key insights to funders that may be used to inform the next phase of the research response including the resulting recovery.

To further COVID CIRCLE's mission this analysis places particular emphasis on research focusing on low- and middle-income countries (LMICs) – defined as any research project that is taking place in at least one LMIC[1]. This includes any project where the research may be taking place in a high-income country, as long as that research is also partially taking part in at least one LMIC (based on the information provided).

It should be noted that this analysis should be considered as an extension to the open-access, peer-reviewed paper produced by COVID CIRCLE[2] that provides an in-depth analysis of the breadth of funding, remaining gaps, opportunities, and trends – which is updated on a quarterly basis. Therefore, this analysis will not duplicate that of the quarterly-updated paper.

DATA LIMITATIONS

The over-arching limitation of the data in the tracker is the varying levels of completeness – which is unsurprising in light of the multiple sources of data from the more than 300 funders around the world. Most notably, data on financial information was only available for 166 of 319 funders included in this version of the tracker – translating to 61.3% of all projects. 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, this analysis avoids presenting any key findings based on amounts of funding – focusing instead on the number of projects.

Another key consequence of the varied levels of data completeness is the potential implication that a lack of qualitative data (e.g., abstracts) has on the accuracy of any coding that was performed on research projects – most notably when categorising projects against the WHO and UN frameworks. To offset the impact of this, all coded projects performed by a member

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[1] LMICs are, in turn, defined as being any country on the OECD Development Action Committee list of Official Development Assistance Recipients.

[2] Bucher, A., Antonio, E., Grund, H., et al. (2022) A living mapping review for COVID-19 funded research projects: 21-month update [version 8; peer review: 2 approved], Wellcome Open Research 5:209. https://doi.org/10.12688/wellcomeopenres.16259.8

of the COVID CIRCLE Team were validated by an independent reviewer not involved with the initial screening and coding process.

Lastly, the comprehensiveness of the tracker database is limited to those funders that either provided data to the COVID CIRCLE team or who have made their awards data publicly (and freely) available online.

WHO PRIORITY AREAS

When comparing the portfolio of LMIC-focused projects on the tracker (2,910 projects) to the rest of the database (13,443 projects), in terms of the priority areas outlined in the WHO Research Roadmap, it can be seen from Figure 1 that, though the distribution of the LMIC-focused projects across the priority areas largely reflect that of the rest of the (non-LMIC-focused) portfolio, there are some key differences to consider. Firstly, the data on the tracker suggests that LMIC-focused COVID-19 research emphasises epidemiological studies than the research from the rest of the database being conducted elsewhere. Not only does the 'Epidemiological Studies' priority area rank higher for LMIC-focused research (with an upper-middle ranking of fourth out of nine priority areas) than for the rest of the database (lower-middle at sixth), the proportion of projects under this priority area is significantly greater for LMIC-focused research (13.6%) than for the rest of the database (8.8%).

When looking deeper into the priority areas, much of this emphasis on epidemiology can be thought of as being driven by the large number of projects examining transmission dynamics – the third-most commonly-funded of the 44 sub-priority areas for LMIC-focused research, constituting 8.2% of the 2,910 projects under consideration (compared to just 4.9% of projects on the rest of the database).

Examining the sub-priorities further, the greatest difference between the portfolios of LMIC-focused research and the rest of the database occurs when considering research supporting the development of diagnostic products. For the LMIC-focused portion of the database, this type of research makes up 10.7% of the portfolio (ranking first among all WHO sub-priority areas) – contrasting to the 6.6% of projects from the rest of the database.

Figure 1 - Number of projects by WHO priority area
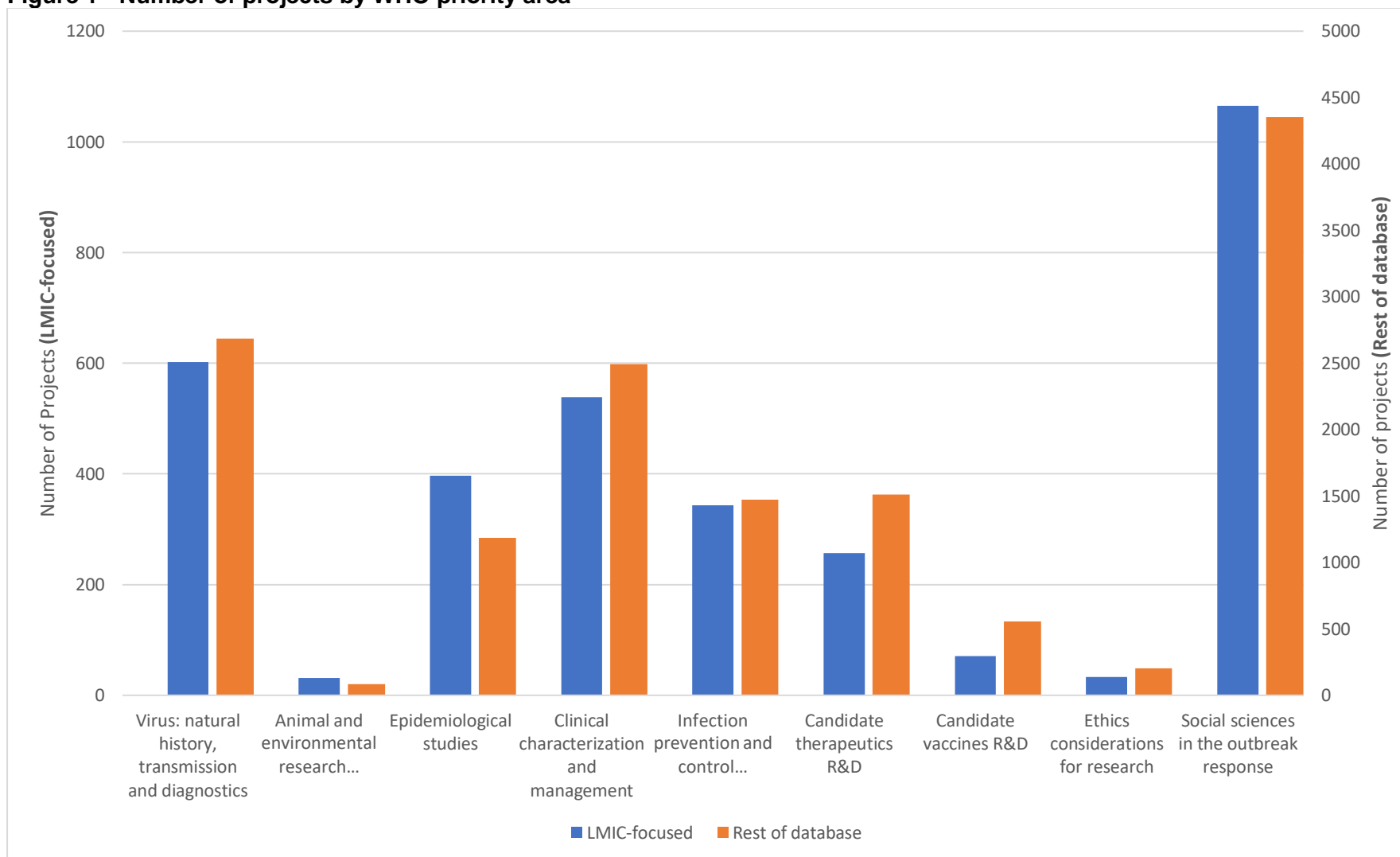

Note for Figure 1: Emphasis has been placed on presenting the number of projects as opposed to amounts awarded by funders as financial information was only available for 61.3% of all projects in entire database (39.5% for LMIC-focused projects).

OVERALL TIMELINE OF LMIC-FOCUSED FUNDING

Analysing how the size of both sets of data have evolved over time again reveals broad similarities with some key differences. By plotting the number of projects for both sets of data according to the publication date of award information by funders (where available), Figure 2 can be used as an approximate timeline to understand when projects were funded during the pandemic response. Generally speaking, while both sets of data see their largest increases over the summer of 2020, the increase in the number of LMIC-focused data was at its greatest in June 2020 (473 projects) – two months before the peak increase for the rest of the database (1,659 projects in August 2020). Figure 2 also shows that a greater proportion of LMIC-focused data were 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 2 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 the issues with the completeness of the 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 is this analysis is therefore placed on the number of projects.

Figure 2 - Cumulative Number of Projects and Known Funding Amounts by Publication Date of Award Information of Projects on Tracker
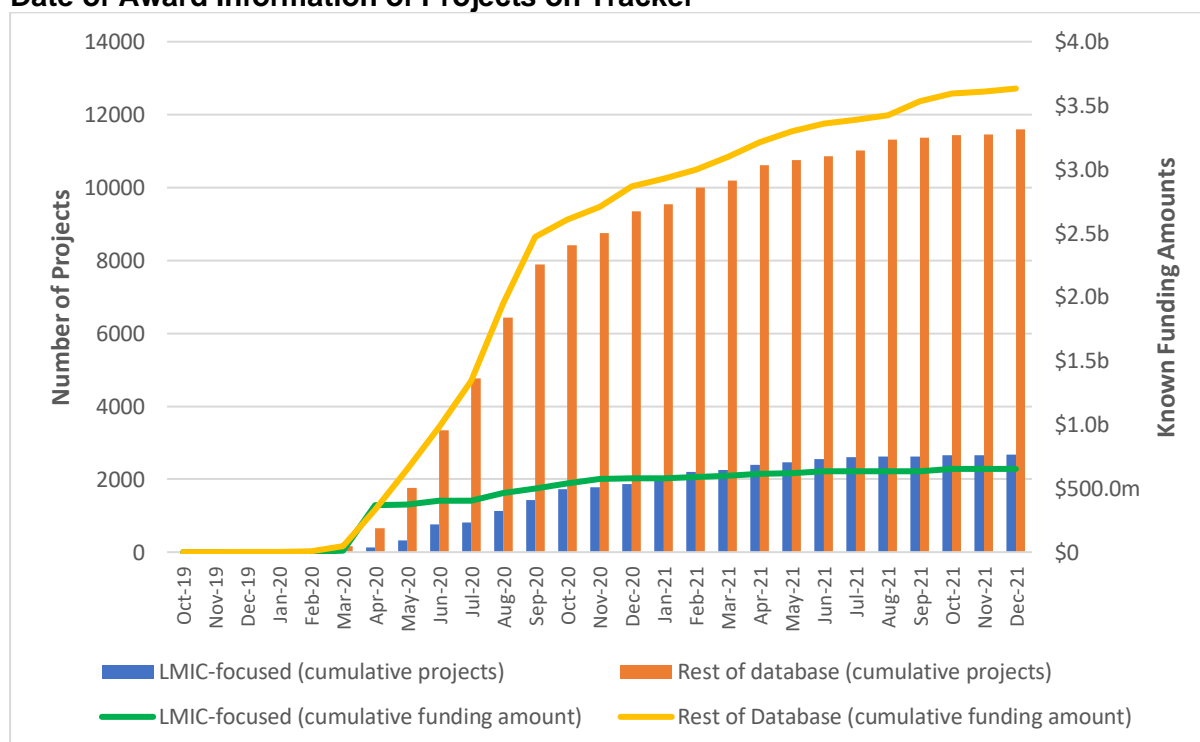
Note for Figure 2: *Financial information available for 61.3% of all projects in entire database (39.5% for LMIC-focused projects). Publication date available for 90.2% of projects in entire database (92.2% for LMIC-focused projects).*

Funders of LMIC Research

In addition to the greatest increase in the number of LMIC-focused projects, June 2020 was the month that featured the greatest number of funders awarding LMIC-focused projects,

according to data on the tracker, with 27 (where award date information was made available). This was led by the Ministry of Science, Technology and Innovation of Argentina, MINCYT, who awarded 114 of the 473 LMIC-focused projects during this month.

In total, 153 funders based in 45 countries have funded COVID-19 research taking place in at least one LMIC. Along with CONACYT, the timeline of the funders awarding the greatest number of LMIC-focused COVID-19 research (funding at least 50 research projects taking place in at least one LMIC with database date information) is presented in Figure 3. Among the funders presented in Figure 3, the International Development Research Centre (IDRC) of Canada, were the first to fund COVID-19 research focusing on LMICs – having made awarded their first grants in March 2020 (according to data on the tracker). More widely, among all 153 funders of LMIC-focused research, Canadian funders awarded more than three quarters (76.7%) of all projects taking place in LMICs by March 2020 according to the tracker data – the same month that COVID-19 was declared a pandemic by the WHO and two months after the agency declared COVID-19 as a public health emergency of international concern.

Figure 3 - Timeline of funders awarding the greatest number of LMIC-focused research projects by date of publication of award information. funding amounts indicated in brackets*.
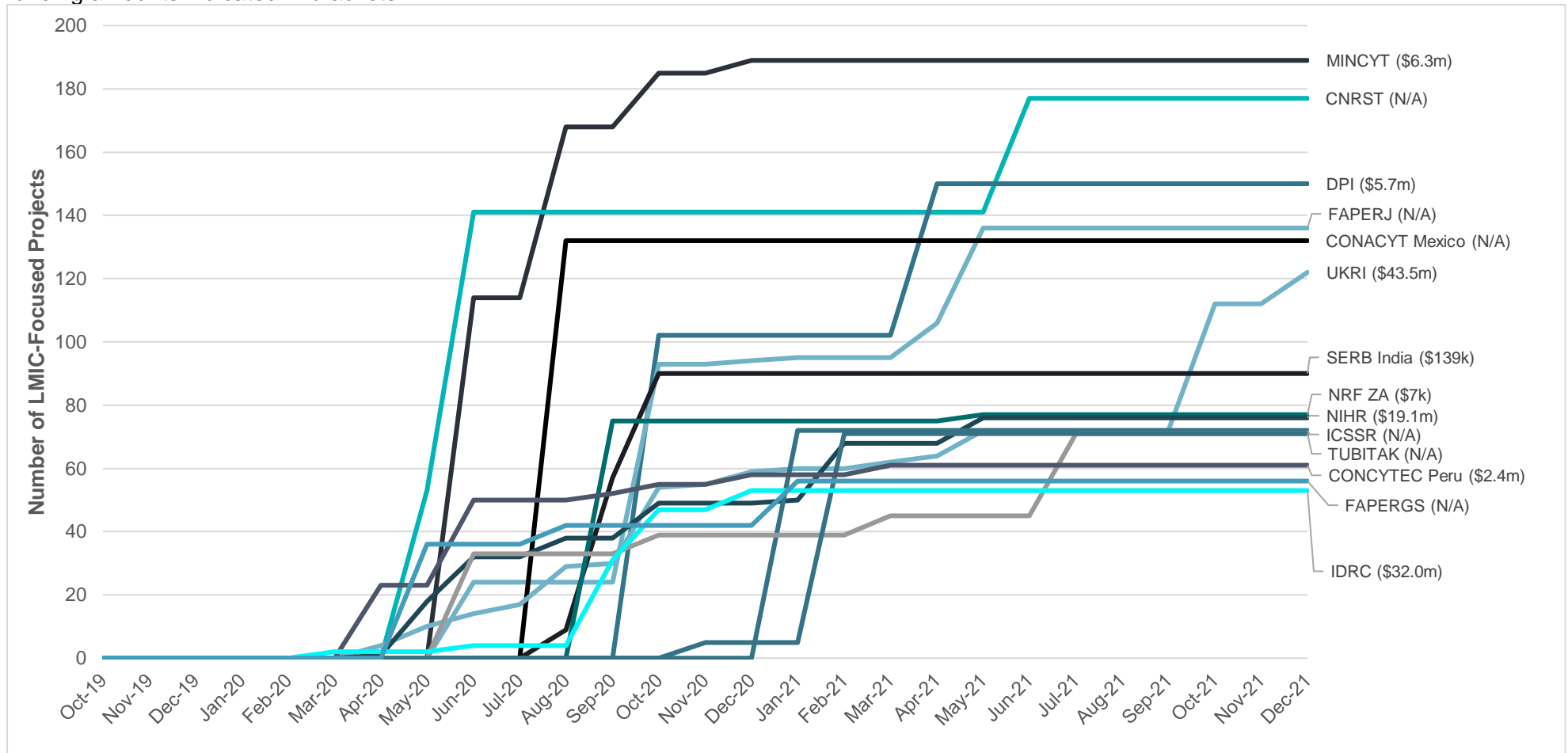
Minimum 50 LMIC-focused research projects with database date information.

Note for Figure 3: *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). Publication date available for 90.2% of projects in entire database (92.2% for LMIC-focused projects).*

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Funding amounts for individual organisations do not account for co-funding between multiple organisations as no information was provided on how funding amounts were divided between the co-funding organisations.

Annexes for the report: COVID CIRCLE lessons for funders

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.

Figure 4 - Timeline of funders based in high-income countries awarding the greatest number of LMIC-focused Research projects by date of publication of award information. Funding amounts indicated in brackets*.
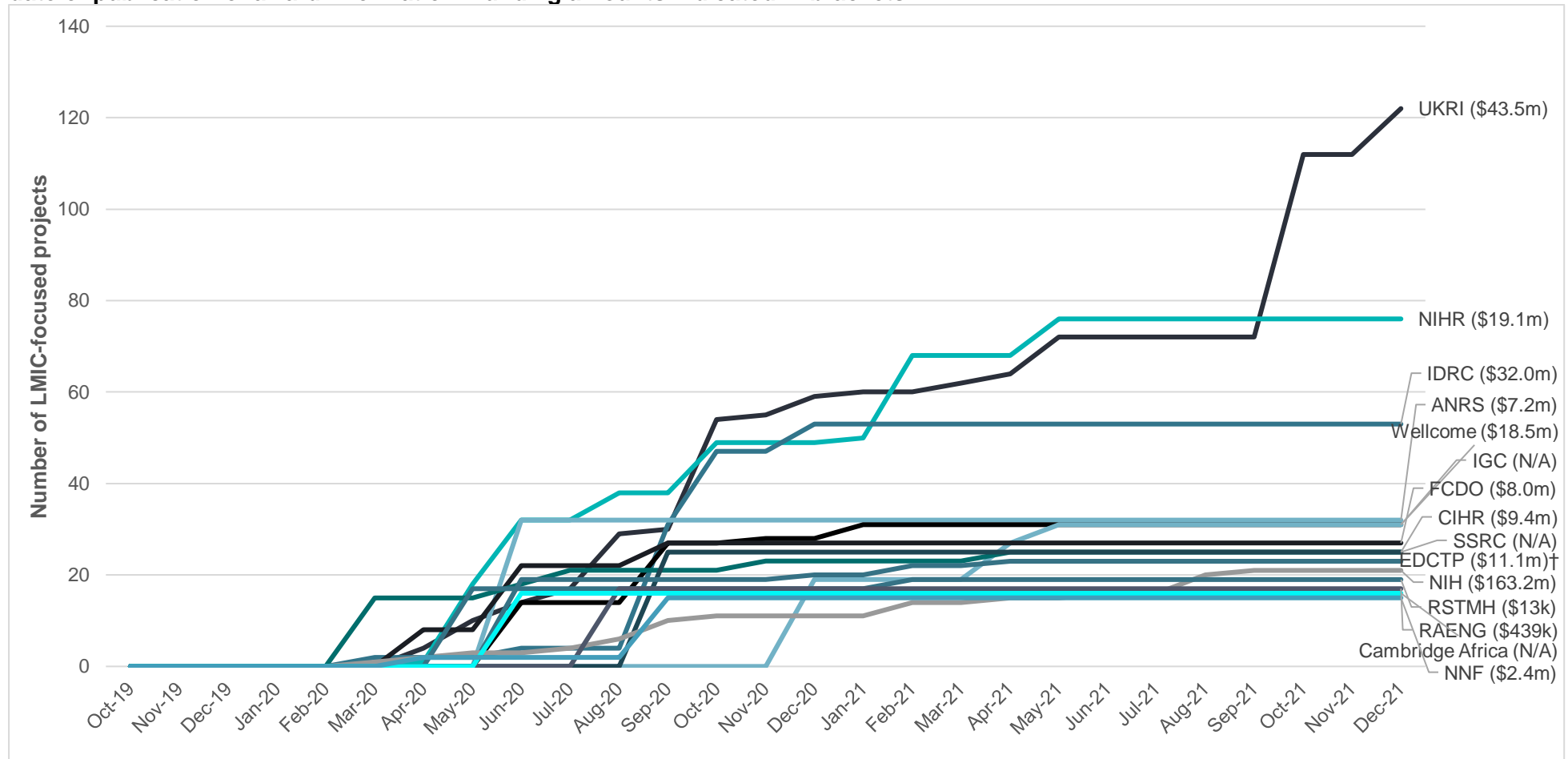
Minimum 15 LMIC-focused research projects with database date information.

Note for Figure 4: *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). Publication date available for 90.2% of projects in entire database (92.2% for LMIC-focused projects).*

Funding amounts for individual organisations **do not account for co-funding between multiple organisations as no information was provided on how funding amounts were divided between the co-funding organisations.*

†See footnote 3.

Table 2 - Portfolio by WHO priority area of top 10 funders based in high-income countries 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
UKRI ($43.5m)	22	3	21	13	14	4	4	2	65	122
DHSC/NIHR ($19.1m)	8	0	10	5	19	2	0	2	55	76
IDRC ($32.0m)	1	0	8	6	5	1	0	0	49	57
ANRS ($7.2m)	4	4	12	5	2	2	0	0	11	35
Wellcome ($18.5m)	4	0	8	2	6	8	2	3	14	32
IGC (N/A)	0	0	1	0	1	0	0	0	31	31
FCDO ($8.0m)	2	0	5	1	7	0	0	1	20	28
EDCTP ($11.1m)[3]	15	0	11	7	1	1	2	0	2	26
CIHR ($9.4m)	5	1	5	6	1	2	1	0	12	25
SSRC (N/A)	0	0	0	0	2	0	0	3	24	25

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).

*Abbreviations and acronyms: **ANRS** - Agence nationale de récherche sur le sida et les hépatites virale (National Agency for AIDS Research); **CIHR** - Canadian Institutes of Health Research; **DHSC** - Department of Health and Social Care (UK); **EDCTP** - European & Developing Countries Clinical Trials Partnership; **FCDO** - Foreign, Commonwealth and Development Office; **IDRC** – International Development Research Centre; **IGC** - International Growth Centre; **NIH** - National Institutes of Health (USA); **NIHR** - National Institute for Health Research; **NNF** - Novo Nordisk Foundation; **RAENG** – Royal Academy of Engineering; **RSTMH** - Royal Society of Tropical Medicine and Hygiene; **SSRC** - Social Science Research Council (USA); **UKRI** - UK Research and Innovation.*

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[3] Since the completion of the analysis, more data has been obtained on the grants made by EDCTP as part of their Emergency Funding Mechanism which now reflects a total value of $15.7m. While the analysis has not been amended to reflect this update due to time considerations, the UKCDR and GloPID-R COVID-19 Funded Research Project Tracker contains the latest data on this.

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.[4] 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' (top priority area for eight funders) or 'Clinical characterization and management' (top priority area for two funders).

In addition to the findings presented in Figure 1, Table 1 provides further insight into the WHO priority areas with the fewest LMIC-focused projects. Specifically, only half of the top funders of LMIC-focused research have funded any projects under the 'Animal and environmental research on the virus origin, and management measures at the human-animal interface' and 'Candidate vaccines R&D'. In addition to this, when examining the portfolios of projects summarised in Table 1, the 'Ethics considerations for research' priority area contains an average of just 1.7 projects across all ten funders – the second lowest average among all priority areas (behind the average of 0.9 projects under the 'Animal and Environmental research' priority area).

However, rather than just thinking about the overall research response to COVID-19, Figure 4 restricts the analysis by displaying which funders based in high-income countries (HICs) awarded the greatest number of LMIC-focused research to understand the international research response to the challenges of the pandemic faced by LMICs (funding at least 15 research projects taking place in at least one LMIC with database date information).

Of the 15 funders based in high-income countries included in Figure 4, four have demonstrated an active and significant commitment to funding research addressing challenges relating to COVID-19 in LMICs throughout the time period under consideration, having awarded projects in at least 5 different months (as indicated by the publication date of award information, where available). Of these four funders, UKRI demonstrated the most sustained funding activity, funding LMIC-focused projects across 15 months. This is followed by the UK Department of Health and Social Care's National Institute for Health Research (8 months), IDRC (5), and CIHR (5).

At a national level across the entirety of the period, funders based in the UK awarded 391 COVID-19 LMIC-focused projects – the most of any high-income country (which accounts for 13.4% of all LMIC-focused projects). This is followed by funders based in the United States (with 107 projects accounting for 3.7% of all LMIC-focused projects), Canada (100 projects translating to 3.4%) and France (88 projects translating to 3.0%).

Interestingly, when looking at the distribution of research projects funded by the top funders of LMIC -focused research based in high-income countries across the WHO priority areas (Table 2), the portfolios of these funders are typically more concentrated on a smaller number of priority areas compared to the portfolio of funders based in LMICs included in Table 1. Furthermore, of all the funders presented in Table 2, only one (UKRI) has funded LMIC-focused projects across all nine priority areas.

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[4] The total number of LMIC-focused research projects funded by an individual funder (such as UKRI) may vary between figure 3 and table 1 as data on the publication date of awards was not always made available for all projects – including projects funded by the same funder.

PRIORITY AREAS OVER TIME

The publication date of award information by funders can also be used to explore changes to the allocation of funding across the WHO priority areas over time for LMIC-focused funding (Figure 5). When considering Figure 5, it is not surprising to see the priority area on 'Social Sciences in the Outbreak Response' being consistently ranked among the priority areas with the most LMIC-focused projects throughout the time period due to how broad social sciences are as a discipline. Additionally, it is worth noting that more than half of all LMIC-focused social sciences projects (66.9%) could not be classified against any of the six corresponding sub-priority areas outlined by the WHO – despite falling under the 'Social Sciences in the Outbreak Response' priority area (this figure reduces to 65.9% when only considering projects with information on the publication date of awards). Should all projects that were unable to be classified against the WHO priority areas be excluded from Figure 5, the social sciences priority would rank third over the course of the time period being examined (behind the 'virus: natural history, transmission and diagnostics' and 'Clinical characterization and management' priority areas).

Figure 5 - Timeline of funding of WHO priority areas for LMIC-focused research (by publication date of award information)
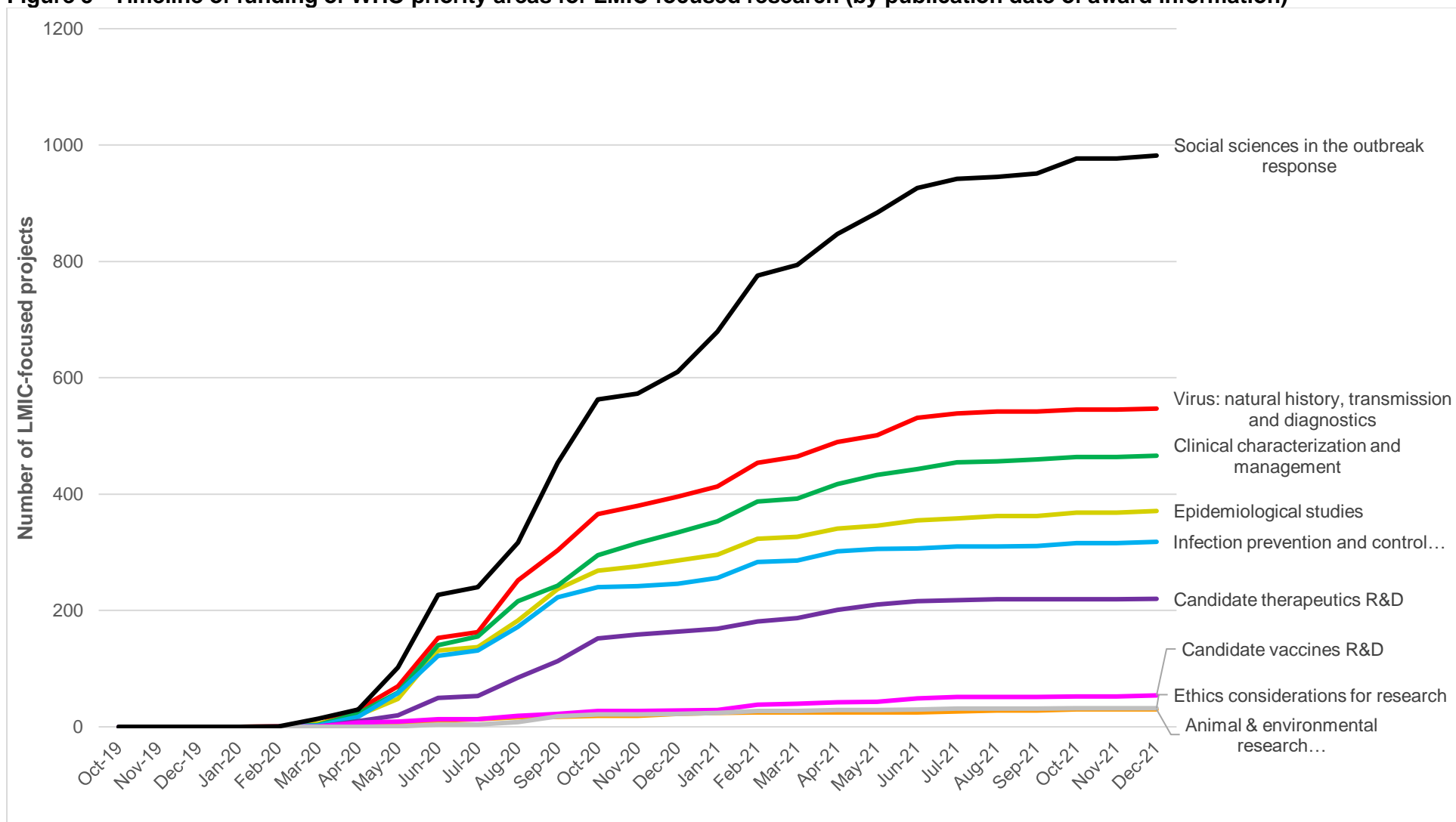
Note for Figure 5: *Emphasis has been placed on presenting the number of projects as opposed to amounts awarded by funders as financial information was only available for 61.3% of all projects in entire database (39.5% for LMIC-focused projects).*

Annexes for the report: COVID CIRCLE lessons for funders

When viewing the entire timeline, it is interesting to note the similarity in the number of projects funded under the four of the WHO priority areas ('Virus: Natural History, Transmission and Diagnostics', 'Clinical Characterization and Management', 'Epidemiological Studies', and 'Infection prevention and control, including health care workers' protection') up to July 2020 before each experiencing varying rates of increase. Figure 5 shows that, among these four priority areas, the rate of growth in the number of projects for the 'Virus: Natural History…' priority area was particularly pronounced between July and October 2020 – outpacing the rate experienced by the other three priority areas with a rate of 124.5% (ahead of the 95.6% rate of growth experienced by the 'Epidemiological Studies' priority area).

This effect can be partially explained by the concentration of projects in a small number of sub-priority areas under each of the other priority areas. Among these four priority areas in question, only the 'Virus: Natural History…' priority area contained more than sub-priority that experienced a growth rate of at least 15 projects on two separate months between July and October 2020.

It is also interesting to see that, early on in the pandemic response, comparatively more emphasis was placed on research that addressed challenges under the 'Epidemiological Studies' priority area in LMICs – ranking as high as second in March 2020 before eventually being ranked fourth by the end of the period under consideration (based on available data on the publication date of awards).

DIFFERENCES IN PRIORITY AREAS ACROSS COUNTRY GROUPS

Significant insights emerge when examining differences in the distribution of research projects across the WHO priority areas over time between different groups of countries. Figures 6 and 7 contrasts the evolution of the priority areas of research taking place in the least developed and low-income countries, with those taking place in middle-income countries.

Among the main differences in the distribution of priority areas between the two country income groupings is the rapid proliferation of the number of research projects taking place among the least developed and low-income countries under the social sciences priority area from August 2020. By the end of the period under consideration, projects under the social sciences priority area accounted for 51.3% of all research projects taking place in at least one of the least developed and low-income countries – far outnumbering the number of projects under 'Epidemiological Studies' (15.6%) – the priority area with the second-greatest number of projects.

As was mentioned earlier, there is a greater emphasis on research under the priority area of 'Epidemiological Studies' for LMIC-focused projects (Figure 1) – and this is particularly pronounced for research being conducted among the least developed and low-income countries where it has consistently outranked research under the (otherwise popular) 'Virus: Natural History, Transmission and Diagnostics' priority area (Figure 6).

Furthermore, when dividing the data on the tracker according to where the research is taking place (Figures 8 to 13), it is only for COVID-19 research that is being conducted in Africa that the 'Epidemiological Studies' priority area ranks highly (second) among the nine WHO priority areas – typically being ranked either sixth or seventh.

Continuing to examine the data along regional lines, the distribution of research projects being conducted in Latin American and the Caribbean (LAC) across the WHO priority areas (Figure 11) stands out as being far more consistent than other regions. Over the course of the period under consideration, the overall rankings of the priority areas changed on only 5 occasions –

far fewer times than the regions with the most frequent ranking changes (Asia and North America, both with 13). Additionally, LAC is the only region whereby the priority area under 'Animal and Environmental Research' was not ranked last by the end of the time period under examination (instead, ranking eighth only ahead of the priority area under 'Ethics Considerations for Research').

Figure 6 - Timeline of funding of WHO priority areas for research focusing on the least developed and low-income countries (by publication date of award information)
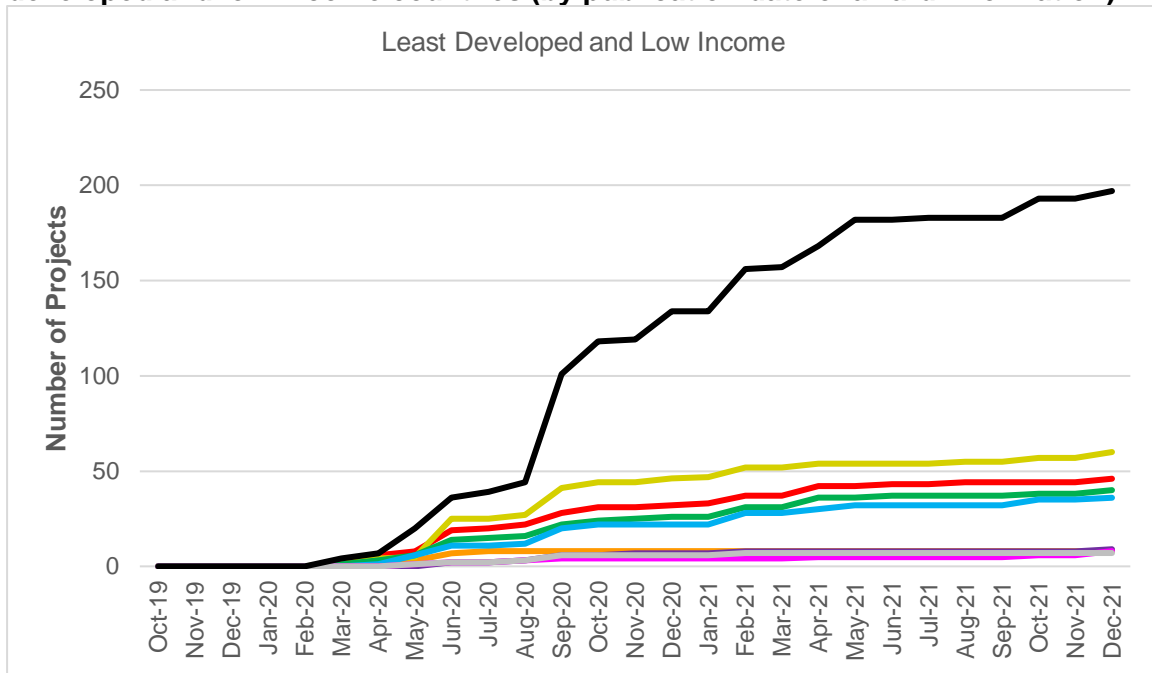
Note for Figure 6: Emphasis has been placed on presenting the number of projects as opposed to amounts awarded by funders as financial information was only available for 61.3% of all projects in entire database (39.5% for LMIC-focused projects).

|				
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	

Figure 7 - Timeline of funding of WHO priority areas for research focusing on middle-income countries (by publication date of award information)

Middle Income
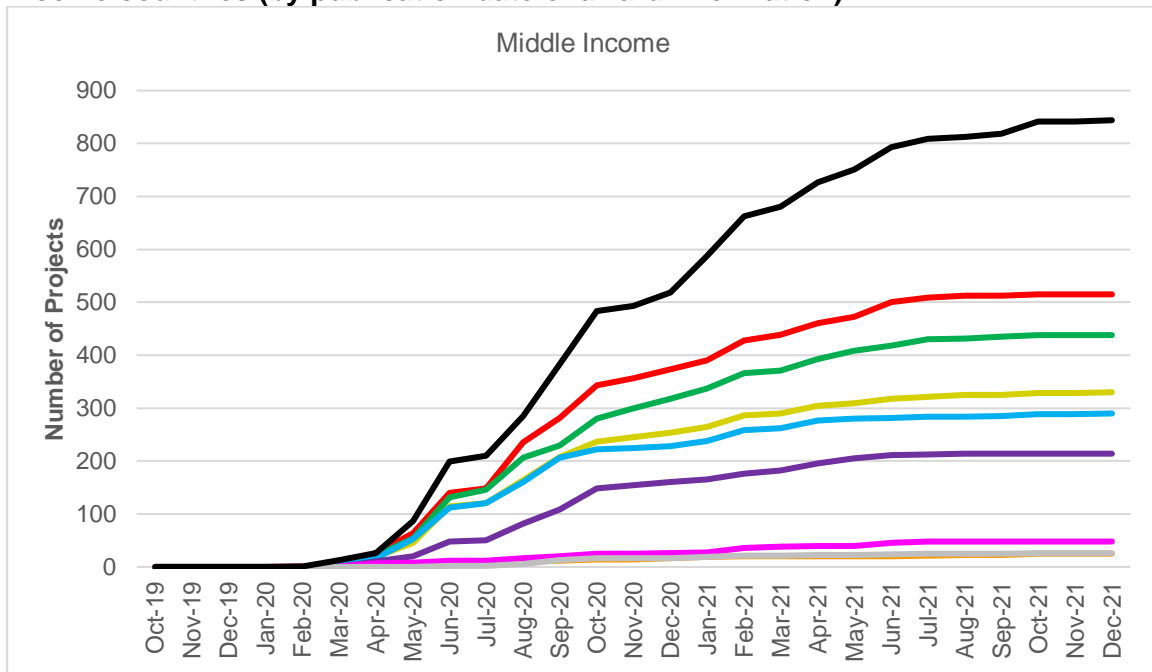
Note for Figure 7: Emphasis has been placed on presenting the number of projects as opposed to amounts awarded by funders as financial information was only available for 61.3% of all projects in entire database (39.5% for LMIC-focused projects).

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	

Figs. 8 – 13 - Timeline of funding of WHO priority areas according to geographic region (by publication date of award information)

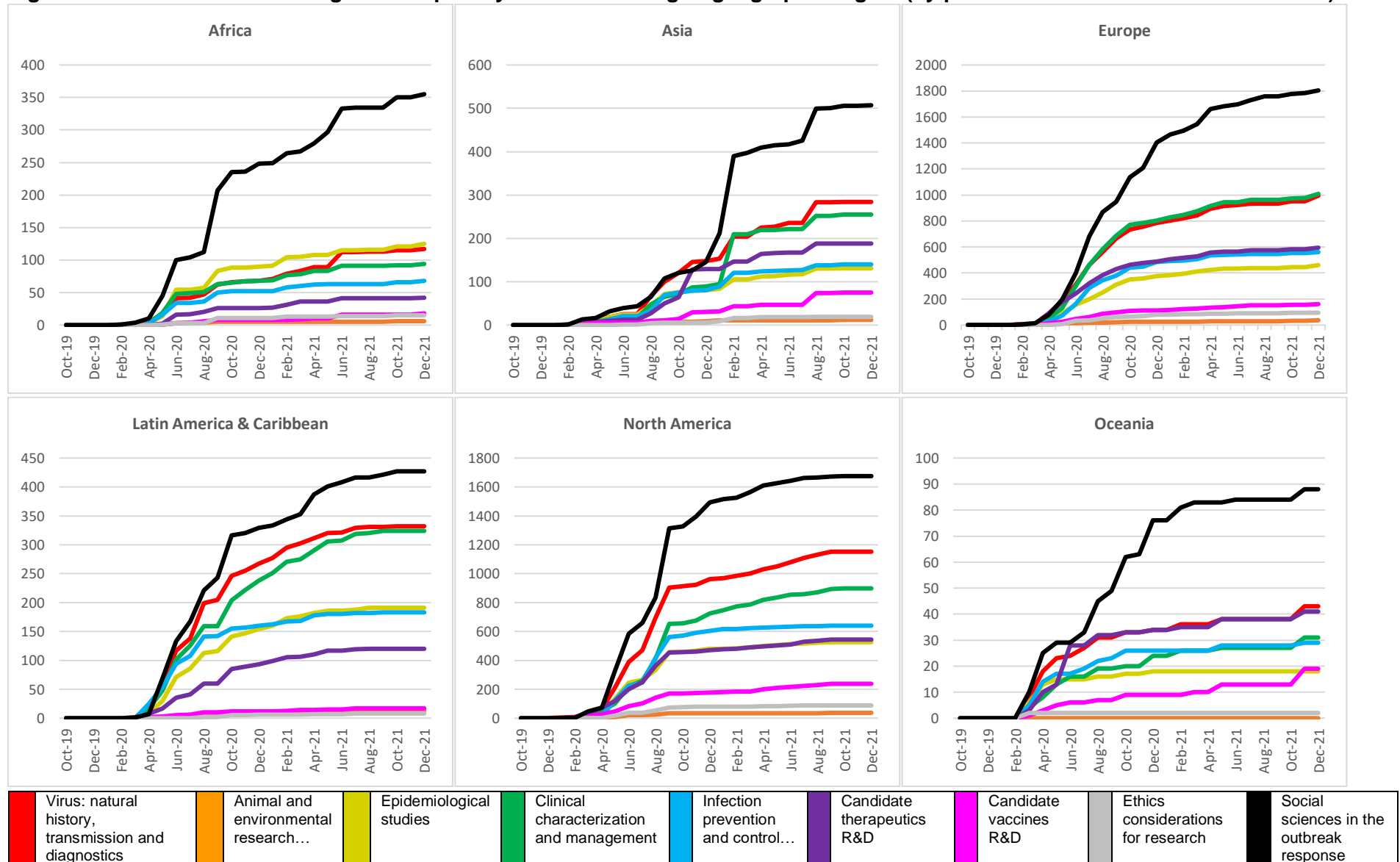| Virus: natural history, transmission and diagnostics	Animal and environmental research…	Epidemiological studies	Clinical characterization and management	Infection prevention and control…	Candidate therapeutics R&D	Candidate vaccines R&D	Ethics considerations for research	Social sciences in the outbreak response

Note for Figures 8-13: *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).*

INTERNATIONAL COLLABORATION

Despite the more than 16,000 projects on the tracker being conducted in 157 countries across the world, available data suggests that only 567 projects (3.5% of projects on the latest version of the tracker) take place across multiple countries. However, the data also suggests that projects taking place across multiple countries mostly involve at least one LMIC (63.3% of projects taking place across multiple countries), as indicated in Table 3.

Table 3 - 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 high-income country	**208**
At least one least developed and/or low-income country and at least one high-income country	**56** (***30** when excluding projects that also focus on a middle-income country*)
At least one middle-income country and at least one high-income country	**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 middle-income country	**104** (***78** when excluding projects that also focus on a high-income country*)

Note for Table 3: *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 figures presented in Table 3 suggest that projects designated as taking place across multiple countries largely involve collaboration between high-income and middle-income countries – accounting for 85.6% of all projects taking place in at least one LMIC and at least one high-income country, and just under half of all multi-country research projects involving at least one LMIC (49.6%).

Significantly, Table 3 also shows that, in terms of collaboration across income groups, collaborations with the least developed and low-income countries comes more frequently from middle-income countries as opposed to high-income countries (almost three-times more frequently when not taking into account collaborations that occur across all three income groups).

Looking at the funders of these 567 multi-country projects, Tables 4 (number of projects) and 5 (known funding amounts) summarise the top funders of this type of research – both in terms of overall multi-country projects as well as those taking place in at least one LMIC. Overall, 97 organisations have funded multi-country projects – which is reduced to 65 when only considering LMIC-focused projects taking place across multiple countries. Additionally, across those funders with at least one project taking place across multiple countries, on average, 53.4% of the portfolio is taking place in at least one LMIC. However, should only funders that have funded projects taking place across multiple countries *and* at least one LMIC, the average proportion of the portfolio taking place in at least one LMIC increases to 79.7%. Furthermore, of the 97 funders with multi-country projects, all but 11 are at least partially based in high-income countries

Table 4 - Top-10 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 Récherche 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 Récherche 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 5 - Top-10 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 5: *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.

Looking at the multi-country collaboration from the perspective of global coverage, Table 6 presents the funders that have funded research taking place across the greatest number of countries throughout their portfolios.

Table 6 - Top-10 funders with the greatest numbers of different (named) countries where research is being conducted (total number of different countries indicated in brackets)
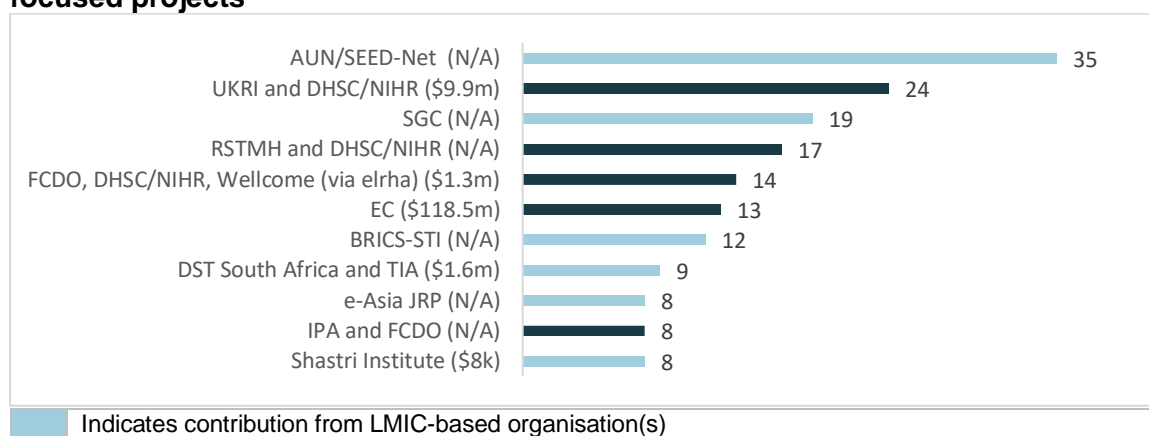
Entire Portfolio	Entire Portfolio - *LMICs Only*	Portfolio of Projects Taking Place Across Multiple Countries	Portfolio of Projects Taking Place Across Multiple Countries AND at least one LMIC
IDRC (68)	IDRC (61)	IDRC (67)	IDRC (60)
EC (58)	DHSC/NIHR (41)	EC (58)	UKRI (39)
UKRI (55)	UKRI (41)	UKRI (53)	DHSC/NIHR (35)
CIHR (51)	Wellcome (35)	CIHR (51)	Wellcome (32)
DHSC/NIHR (47)	ANRS (32)	DHSC/NIHR (41)	ANRS (27)
Wellcome (39)	NIH (29)	Wellcome (36)	NIH (26)
NIH (35)	FCDO (27)	NIH (32)	CIHR (24)
ANRS (33)	CIHR (24)	ANRS (28)	EC (24)
SSRC (31)	EC (24)	EDCTP (27)	EDCTP (21)
FCDO (30)	EDCTP (22)	Alberta Innovates (25)	FCDO (20)

Note for Table 6: 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: ANRS - Agence nationale de récherche sur le sida et les hépatites virale; CIHR - Canadian Institutes of Health Research; DHSC - Department of Health and Social Care (UK); EC - European Commission; EDCTP - European & Developing Countries Clinical Trials Partnership; FCDO - Foreign, Commonwealth and Development Office; IDRC - International Development Research Centre; NIH - National Institutes of Health (USA); NIHR - National Institute for Health Research; SSRC - Social Science Research Council (USA); UKRI - UK Research and Innovation

At a higher funding level, a total of 791 out of the 16,353 projects on the tracker (4.8%) were funded as a result of co-funding – either from multiple organisations directly or from membership-based organisations. Of this, 248 projects (31.4%) are being conducted in at least one LMIC, with the top 10 co-funders of these projects presented in Figure 14. At the individual level, the UK's National Institute for Health Research co-funded 57 LMIC-focused projects – the most out of any organisation that co-funded such research. This is reflective of data at a national level whereby 143 of the 791 co-funded projects were co-funded by at least one organisation based in the UK – the most out of any of the more than 20 relevant countries, followed by Canada and Chile (66 each).

Figure 14 - Top co-funding organisations awarding the greatest number of LMIC-focused projects

AUN/SEED-Net (N/A)	35
UKRI and DHSC/NIHR ($9.9m)	24
SGC (N/A)	19
RSTMH and DHSC/NIHR (N/A)	17
FCDO, DHSC/NIHR, Wellcome (via elrha) ($1.3m)	14
EC ($118.5m)	13
BRICS-STI (N/A)	12
DST South Africa and TIA ($1.6m)	9
e-Asia JRP (N/A)	8
IPA and FCDO (N/A)	8
Shastri Institute ($8k)	8

Indicates contribution from LMIC-based organisation(s)

Note for Figure 14: *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: AUN/SEED-Net *- JICA Technical Cooperation Project for ASEAN University Network/Southeast Asia Engineering Education Development Network;* ***BRICS-STI*** *- Brazil, Russia, India, China, and South Africa Science, Technology, and Innovation Framework Programme;* ***DHSC*** *- Department of Health and Social Care (UK);* ***DST South Africa*** *- Department of Science and Innovation South Africa;* ***e-Asia JRP*** *- East Asia Science and Innovation Area Joint Research Program;* ***EC*** *- European Commission;* ***FCDO*** *- Foreign, Commonwealth and Development Office;* ***IPA*** *- Innovations for Poverty Action;* ***NIHR*** *- National Institute for Health Research;* ***RSTMH*** *- Royal Society of Tropical Medicine and Hygiene;* ***SGC*** *- Sino-German Center for Research Promotion;* ***TIA*** *- Technology Innovation Agency South Africa;* ***UKRI*** *- UK Research and Innovation*

INTERDISCIPLINARITY

Another way to understand the extent of the collaboration associated with the research projects included in the tracker is to examine how many are interdisciplinary in nature. To assess this, a project was deemed interdisciplinary if either of the following conditions were met:

1. The WHO priority area assigned to a project included one of the seven medical science-oriented priority areas AND either one of the two non-medical science priority areas (namely 'Ethics considerations for research' and 'Social Sciences in the Outbreak Response');
2. The abstract of a given project (where available) makes reference to the project being inter-/cross-/multi- disciplinary.

Overall, 1,355 projects (8.3%) of the projects on the tracker were considered to be interdisciplinary using either method – 216 of which are LMIC-focused (15.9% of all interdisciplinary projects).

Outside of the non-medical science priority areas, projects deemed interdisciplinary were most-commonly categorised against the priority area on 'Infection Prevention and Control' – accounting for 41.7% of the interdisciplinary LMIC-focused projects and 37.3% of interdisciplinary projects overall (Table 7).

Table 7 - Interdisciplinary projects by medical science-oriented WHO priority area

WHO Priority Area	Total number of Interdisciplinary Projects (percentage indicated in brackets)	Total number of LMIC-focused Interdisciplinary Projects (percentage indicated in brackets)
Virus: natural history, transmission and diagnostics	**173** (12.8%)	**21** (9.7%)
Animal and environmental research...	**14** (1.0%)	**6** (2.8%)
Epidemiological studies	**281** (20.7%)	**43** (19.9%)
Clinical characterization and management	**297** (21.9%)	**43** (19.9%)
Infection prevention and control...	**505** (37.3%)	**90** (41.7%)
Candidate therapeutics R&D	**74** (5.5%)	**10** (4.6%)
Candidate vaccines R&D	**35** (2.6%)	**3** (1.4%)

Note for Table 7: 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).

In both cases, this can be considered largely a result of one of this priority area's sub-priorities that examines '*factors and methods influencing compliance with evidence-based IPC interventions during outbreak response*' which, conceptually, has natural linkages to social sciences. It is thus unsurprising to learn that, not only was this the most common sub-priority area for all interdisciplinary projects (accounting for 26.4% of all LMIC-focused interdisciplinary projects and 21.6% of interdisciplinary projects overall), but that the number of projects categorised against this sub-priority area greatly outnumbers the sub-priority area with the second greatest number of projects. For LMIC-focused projects, this was the sub-priority looking at the '*effectiveness of restriction of movement of healthy exposed and infected persons to prevent secondary transmission*' (12.0% of LMIC-focused interdisciplinary projects), and for all interdisciplinary projects, this was the sub-priority area examining '*transmission dynamics*' under the 'Epidemiological Studies' priority area (11.4% of all interdisciplinary projects).

Table 8 presents the top-10 funders of interdisciplinary research (both for LMIC-focused research and overall). With respect to all interdisciplinary projects, funders based in the United States collectively funded 567 interdisciplinary projects (41.8%) – the most out of any country, followed by funders based in the UK (276 projects totalling 20.4%) and Canada (159 projects totalling 11.7%). When considering LMIC-focused projects, funders based in the UK are ranked first (80 projects worth 37.0% of all LMIC-focused interdisciplinary research) followed by funders based in Brazil (40 projects totalling 18.5%) and Canada (19 projects totalling 8.8%).

Interestingly, while funders based in high-income countries collectively funded 95.4% of all interdisciplinary projects, this figure is reduced to 59.3% when only considering research taking place in at least one LMIC.

Table 8 - Top-10 funders of interdisciplinary projects

| Rank	Top Funders of Interdisciplinary Projects (1,355 total)	Top Funders of Interdisciplinary LMIC-focused Projects (216 total)
1	**NSF** (274 projects; 20.2%)	**UKRI** (27 projects; 12.5%)
2	**NIH** (202 projects; 14.9%)	**DHSC/NIHR** (22 projects; 10.2%)
3	**UKRI** (176 projects; 13%)	**DPI** (15 projects; 6.9%)
4	**CIHR** (65 projects; 4.8%)	**NRF South Africa** (14 projects; 6.5%)
5	**DHSC/NIHR** (35 projects; 2.6%)	**FAPESP** (12 projects; 5.6%)
6	**EC** (22 projects; 1.6%)	**IDRC** (10 projects; 4.6%)
7	**PCORI** (21 projects; 1.5%)	**Innovate Peru** (9 projects; 4.2%)
8	**DFG** (18 projects; 1.3%)	**TUBITAK** (8 projects; 3.7%)
9	**ZonMw** (18 projects; 1.3%)	**CONACYT Mexico** (7 projects; 3.2%)
10	**SNF** (16 projects; 1.2%)	**Wellcome** (6 projects; 2.8%) **FCDO** (6 projects; 2.8%) **CNRST** (6 projects; 2.8%)

Note for Table 8: *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: CIHR - Canadian Institutes of Health Research; CNRST - Centre National pour la Recherche Scientifique et Technique (National Center for Scientific and Technical Research Morocco); CONACYT Mexico - Consejo Nacional de Ciencia y Tecnología (Mexico National Council of Science and Technology); DFG - Deutsche Forschungsgemeinschaft (German Research Foundation); DHSC - Department of Health and Social Care (UK); DPI - Decanato de Pesquisa e Inovação Universidade de Brasília (Dean of Research and Innovation University of Brasilia); EC - European Commission; FAPESP - Fundação de Amparo à Pesquisa do Estado de São Paulo (São Paulo Research Foundation);FCDO - Foreign, Commonwealth and Development Office; IDRC - International Development Research Centre; NIH - National Institutes of Health (USA); NIHR - National Institute for Health Research; NRF South Africa - National Research Foundation; PCORI - Patient-Centered Outcomes Research Institute; SNF - Schweizerischer Nationalfonds zur Förderung der wissenschaftlichen Forschung (Swiss National Science Foundation); TUBITAK - Türkiye Bilimsel ve Teknolojik Araştırma Kurumu (Scientific and Technological Research Council of Turkey); UKRI - UK Research and Innovation; ZonMw - Nederlandse organisatie voor gezondheidsonderzoek en zorginnovatie (Netherlands Organisation for Health Research and Development)

INSTITUTIONS

The 16,353 COVID-19 research projects under consideration for this analysis was awarded to 5,686 institutions based in 109 countries (Figure 15) – though institutional data was missing for 2,222 projects, or 13.6% of the database.

Figure 15 - Location of institutions leading on COVID-19 research
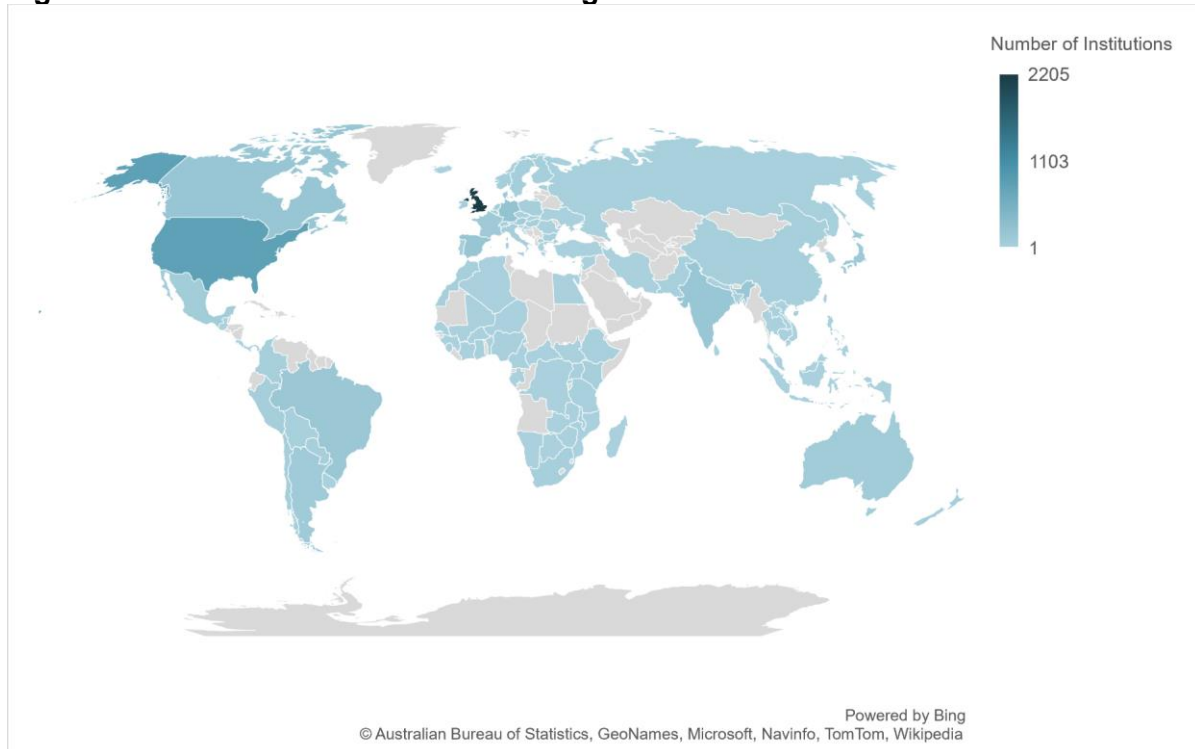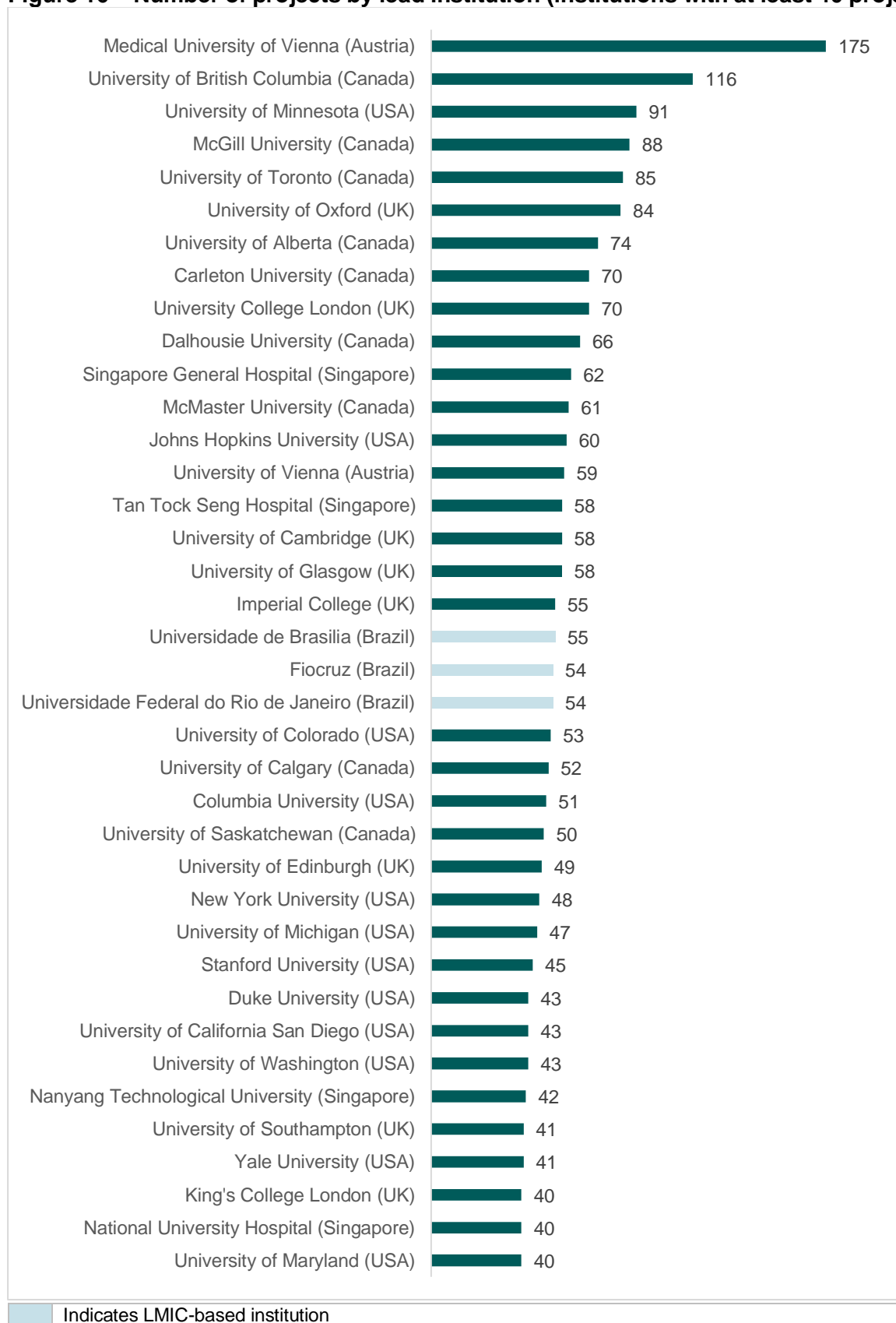

Note for Figure 15: Institutional data available for 86.4% of projects in database.

Figure 16 summarises the institutions that were designated as the 'lead' institution for the greatest number of projects. From figure 16, it can be seen that institutions based in Canada were the most prominent among those leading on the greatest number of COVID-19-related research (according to data on the tracker) – with six of these institutions ranking in the top ten.

While individual institutions are prominent, the 178 institutions based in Canada ranks fifth in terms of the total number of institutions at the national level – behind the United Kingdom (2,205 institutions), the United States (802), Germany (236), and Spain (183). This suggests that research being conducted in Canada is concentrated in a relatively smaller number of institutions. Looking at the projects-per-institution ratio (PPIR), Canada's PPIR of 7.46 ranks third among all countries – which is significantly greater than the only other countries whose institutions are also leading in excess of 1,000 projects, namely the United States (PPIR of 3.93 – ranking eighth) and the United Kingdom (PPIR of 1.65 – ranking 41st).

Figure 16 – Number of projects by lead institution (institutions with at least 40 projects)
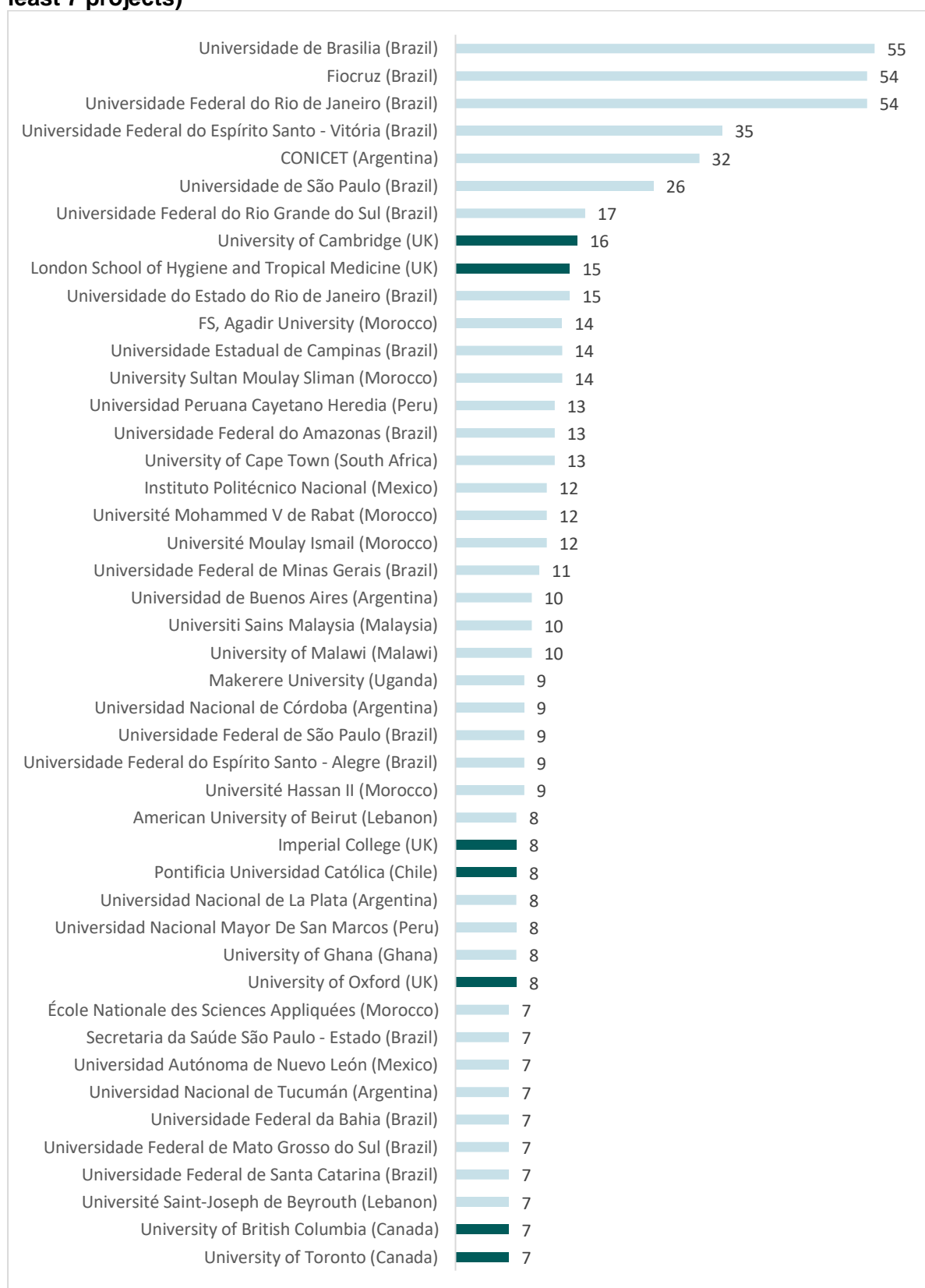
Institution	Projects
Medical University of Vienna (Austria)	175
University of British Columbia (Canada)	116
University of Minnesota (USA)	91
McGill University (Canada)	88
University of Toronto (Canada)	85
University of Oxford (UK)	84
University of Alberta (Canada)	74
Carleton University (Canada)	70
University College London (UK)	70
Dalhousie University (Canada)	66
Singapore General Hospital (Singapore)	62
McMaster University (Canada)	61
Johns Hopkins University (USA)	60
University of Vienna (Austria)	59
Tan Tock Seng Hospital (Singapore)	58
University of Cambridge (UK)	58
University of Glasgow (UK)	58
Imperial College (UK)	55
Universidade de Brasilia (Brazil)	55
Fiocruz (Brazil)	54
Universidade Federal do Rio de Janeiro (Brazil)	54
University of Colorado (USA)	53
University of Calgary (Canada)	52
Columbia University (USA)	51
University of Saskatchewan (Canada)	50
University of Edinburgh (UK)	49
New York University (USA)	48
University of Michigan (USA)	47
Stanford University (USA)	45
Duke University (USA)	43
University of California San Diego (USA)	43
University of Washington (USA)	43
Nanyang Technological University (Singapore)	42
University of Southampton (UK)	41
Yale University (USA)	41
King's College London (UK)	40
National University Hospital (Singapore)	40
University of Maryland (USA)	40

Indicates LMIC-based institution

Note for Figure 16: *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). Institutional data available for 86.4% of projects in database.*

Significantly, of the 38 institutions presented in Figure 16, only three LMIC-based institutions are the lead on at least 40 projects – all of which are based in Brazil. Overall, of the 5,687 institutions leading on COVID-19 research, 914 (16.1%) are based in LMICs.

To get a better understanding of the research response to COVID-19 as it pertains to LMICs, Figure 17 presents the institutions that were designated as the lead for the greatest number of LMIC-focused research projects. Continuing on the initial findings that were suggested in Figure 16, it can be seen from Figure 17 that Brazilian-based institutions led on the greatest number of LMIC-focused COVID-19 research projects – with seven institutions listed among the top ten. Furthermore, the large difference in the number of LMIC-focused research projects between the institutions ranked third and fourth in Figure 17 further underlines the prominence of Brazilian institutions for LMIC-focused research.

Figure 17 - Number of LMIC-focused projects by lead institution (institutions with at least 7 projects)
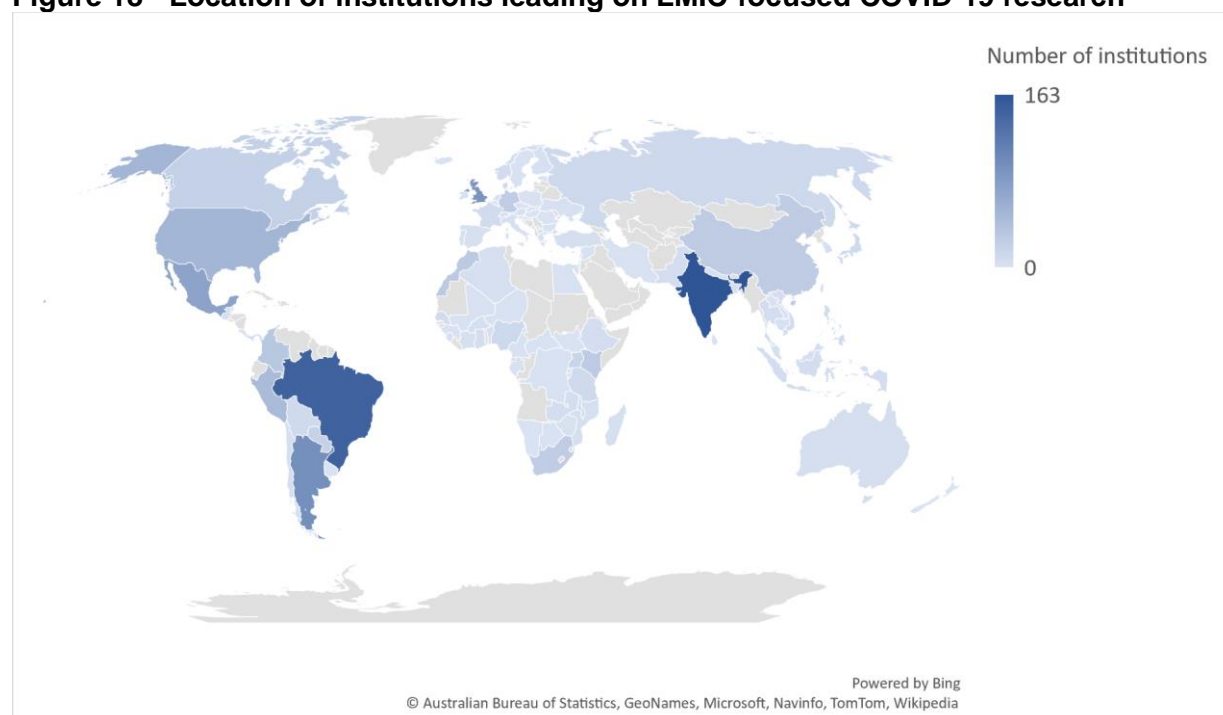
Institution	Projects
Universidade de Brasilia (Brazil)	55
Fiocruz (Brazil)	54
Universidade Federal do Rio de Janeiro (Brazil)	54
Universidade Federal do Espírito Santo - Vitória (Brazil)	35
CONICET (Argentina)	32
Universidade de São Paulo (Brazil)	26
Universidade Federal do Rio Grande do Sul (Brazil)	17
University of Cambridge (UK)	16
London School of Hygiene and Tropical Medicine (UK)	15
Universidade do Estado do Rio de Janeiro (Brazil)	15
FS, Agadir University (Morocco)	14
Universidade Estadual de Campinas (Brazil)	14
University Sultan Moulay Sliman (Morocco)	14
Universidad Peruana Cayetano Heredia (Peru)	13
Universidade Federal do Amazonas (Brazil)	13
University of Cape Town (South Africa)	13
Instituto Politécnico Nacional (Mexico)	12
Université Mohammed V de Rabat (Morocco)	12
Université Moulay Ismail (Morocco)	12
Universidade Federal de Minas Gerais (Brazil)	11
Universidad de Buenos Aires (Argentina)	10
Universiti Sains Malaysia (Malaysia)	10
University of Malawi (Malawi)	10
Makerere University (Uganda)	9
Universidad Nacional de Córdoba (Argentina)	9
Universidade Federal de São Paulo (Brazil)	9
Universidade Federal do Espírito Santo - Alegre (Brazil)	9
Université Hassan II (Morocco)	9
American University of Beirut (Lebanon)	8
Imperial College (UK)	8
Pontificia Universidad Católica (Chile)	8
Universidad Nacional de La Plata (Argentina)	8
Universidad Nacional Mayor De San Marcos (Peru)	8
University of Ghana (Ghana)	8
University of Oxford (UK)	8
École Nationale des Sciences Appliquées (Morocco)	7
Secretaria da Saúde São Paulo - Estado (Brazil)	7
Universidad Autónoma de Nuevo León (Mexico)	7
Universidad Nacional de Tucumán (Argentina)	7
Universidade Federal da Bahia (Brazil)	7
Universidade Federal de Mato Grosso do Sul (Brazil)	7
Universidade Federal de Santa Catarina (Brazil)	7
Université Saint-Joseph de Beyrouth (Lebanon)	7
University of British Columbia (Canada)	7
University of Toronto (Canada)	7

Indicates LMIC-based institution

Note for Figure 17: *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). Institutional data available for 86.4% of projects in database.*

Despite there being 147 institutions leading on LMIC-focused research based in Brazil, the total number of Brazilian institutions still ranks second to India's 163. However, due in large part to the large difference in the total number of projects being led by institutions based in Brazil (565 ranking first) and India (223 ranking second), the PPIR for Brazilian institutions as a whole (3.84 ranking fourth) is far greater that of Indian institutions as a whole (1.37 ranking 37th).

In addition to Brazil, it can also be seen from Figure 17 more widely that there is a heavy presence of institutions based in LAC. Out of the 1,157 institutions leading on LMIC-focused COVID-19 research, 439 (37.9%) are based in the LAC region – the first among all regions followed by Southern Asia (176 institutions), Northern Europe (115), and Eastern Africa (87). The distribution of all 1,157 institutions leading on LMIC-focused research is presented in Figure 18.

Figure 18 - Location of institutions leading on LMIC-focused COVID-19 research

Note for Figure 18: Institutional data available for 86.4% of projects in database.

Despite their relatively low numbers in Figure 18, there are a total of 267 institutions based in high-income countries leading LMIC-focused research – second only to institutions based in upper-middle income countries (Table 9). However, only 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 institution based in a high-income country that has led on at least one LMIC-focused project. This figure is reduced to 31.8% when only considering the 65 institutions based in high-income countries that have led on at least two LMIC-focused projects.

Table 9 - Number of lead institutions of LMIC-focused research by OECD DAC income group

	Number of Institutions	Number of Institutions with more than one LMIC-focused project
Least Developed and Low Income	85	16
Lower-Middle Income	288	80
Upper-Middle Income	517	154
High Income	267	65

Note for Table 9: Institutional data available for 86.4% of projects in database.

Looking more closely at the portfolios of the lead institutions, table 10 presents the institutions leading on the greatest number of projects under each of the WHO priority areas for both the overall and LMIC-focused portfolios. Taken together with the large number of institutions and corresponding number of projects of institutions based in Brazil (Figure 17), it comes as little surprise to see that Brazilian-based institutions led on the greatest amount of LMIC-focused research for all but three of the WHO priority areas (Table 10). To further highlight the heavy concentration of Brazilian institutions with respect to LMIC-focused research, institutions based in the Latin American country ranked no lower than second under each of the nine WHO priority areas

Table 10 - Lead institutions with the greatest number of projects by WHO priority area. Number of projects indicated in brackets.

WHO Priority Area	Overall	LMIC-focused
Virus: natural history, transmission and diagnostics	Medical Uni Vienna (40)	Fiocruz (21)
Animal and environmental research…	Uni Glasgow (4); Uni Liverpool (4)	Fiocruz (3)
Epidemiological studies	Uni British Columbia (29)	CONICET (9)
Clinical characterization and management	Medical Uni Vienna (71)	Fiocruz (23)
Infection prevention and control…	Uni Toronto (17)	CONICET (8)
Candidate therapeutics R&D	Uni British Columbia (25)	Fiocruz (12)
Candidate vaccines R&D	Imperial College (10)	Uni Federal Rio de Janeiro (3)
Ethics considerations for research	Uni Oxford (4)	Makerere Uni (2)
Social sciences in the outbreak response	Carleton Uni (38)	Uni Brasilia (25)

Note for Table 10: 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). Institutional data available for 86.4% of projects in database.

ANALYSIS AGAINST UN RESEARCH ROADMAP (UNRR)

This section of the report provides an analysis of data on the COVID CIRCLE Tracker mapped against the pillars and priorities outlined in the UN Research Roadmap for the COVID-19 Recovery (UNRR). As the research response to COVID-19 continues to shift attention to the post-pandemic world, the UNRR was developed rapidly in response to the need to 'recover better' on a worldwide level towards a more equitable, resilient, and sustainable future. Intended as a tool to align global research response efforts, the UNRR focuses on macroeconomics, fiscal policies, gender equity, and an investment in public services.

The database of projects categorised against the UNRR included 4,942 projects (30.2% of all projects in the database). Of these, 4,055 involved at least one HIC (82.1%) and 902 involved at least one LMIC (18.3%).

Looking at the distribution of projects in the database across the pillars outlined in the UNRR (Figure 19), the largest proportion of projects for the entirety of the database was coded against 'Social protections and basic services' (41.7%), followed by the pillar on 'Health systems and services' (31.1%). On the other hand, very few projects in the database are coded against 'Macroeconomic policies and multilateral collaboration' (3.7%). When comparing the various subsets of data, it is interesting to note the noticeably higher ranking of the pillar on 'Economic Response and Recovery Programs' for the LMIC-focused projects (second out of the five pillars) when compared to the rest of the database (fourth). Additionally, despite having the fewest number of projects across both subsets of data, LMIC-focused projects featured a higher proportion of projects categorised against 'Macroeconomic policies and multilateral collaboration' pillar (6.7%) than for the rest of the database (3.1%).

Figure 19 - Number of projects by UNRR pillar
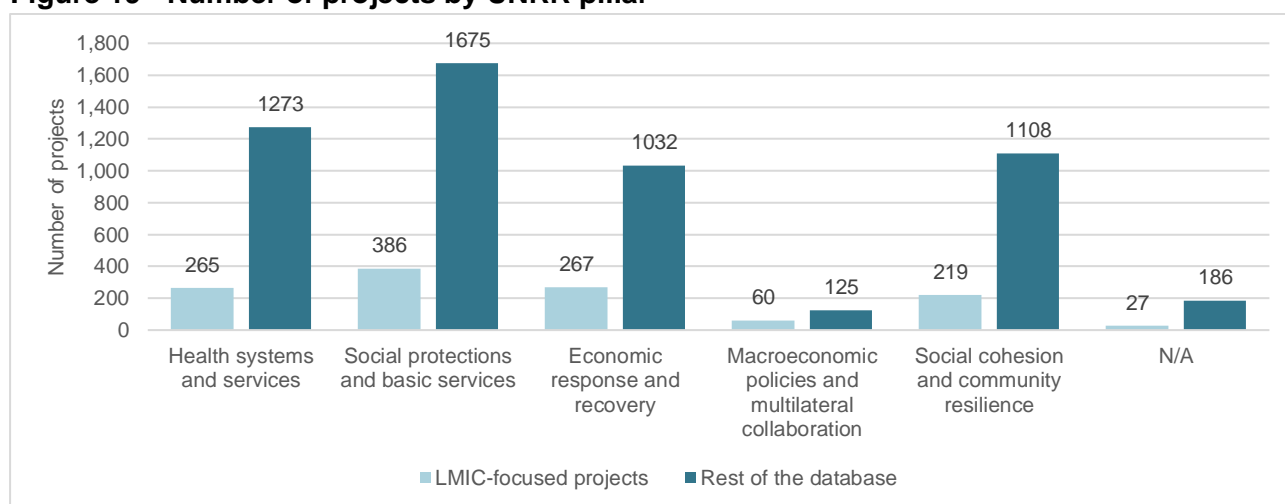
Note for Figure 19: *Individual research projects may be assigned to multiple UNRR pillars*
Emphasis has been placed on presenting the number of projects as opposed to amounts awarded by funders as financial information was only available for 61.3% of all projects in entire database (39.5% for LMIC-focused projects).

Overall, 1,401 projects in the UNRR database map across multiple pillars (28.3% of all UNRR projects), 271 of which take place in at least one LMIC country (accounting for 30% of all LMIC projects). Table 11 illustrates this overlap between pillars – with the most common occurring between the 'Social cohesion and community resilience' and 'Health systems and services' pillars (448 projects). However, the highest proportion of overlapping projects for a given pillar was for projects coded against 'Macroeconomic policies and multilateral collaboration', where 50% of such projects were also categorised against the 'Economic response and recovery' pillar.

Table 11 - Overlap between UNRR pillars

UNRR pillar	Health systems and services	Social protections and basic services	Economic response and recovery	Macroeconomic policies and multilateral collaboration	Social cohesion and community resilience
Health systems and services		353 (23%)	111 (7%)	40 (3%)	448 (29%)
Social protections and basic services	353 (17%)		364 (18%)	41 (2%)	402 (20%)
Economic response and recovery	111 (9%)	364 (28%)		92 (7%)	141 (11%)
Macroeconomic policies and multilateral collaboration	40 (22%)	41 (22%)	92 (50%)		25 (14%)
Social cohesion and community resilience	448 (34%)	402 (30%)	141 (11%)	25 (2%)	

UNRR PILLARS AND PRIORITIES BREAKDOWN

In Table 12, the number of projects falling within each priority area are presented. The five most common areas are those in the darkest shades for LMIC-focused projects and the rest of the database (see the annex for more detail).

The data presented in Figure 19 showed that, while 'Social protections and basic services' was the top pillar for both subsets of data (LMIC-focused projects and the rest of the database), Table 12 demonstrates that, for the projects in the rest of the database, this was particularly concentrated around priority area 2.5 (37.1% of the projects mapped against this pillar were also mapped against 2.5, compared to 31.9% of LMIC-focused projects).

It is also interesting to note that, in line with a higher proportion of LMIC-focused projects being mapped against 'Macroeconomic policies and multilateral collaboration', there are more projects in LMICs focusing on priority 4.1 than in the whole database, despite the significant difference in size between the two subsets of data. The only other priority with more projects in LMICs than in the rest of the database was priority 3.4.

Table 12 - UNRR pillars and priorities: number of projects and proportion of all projects

	UNRR pillar (name)	Number of projects					Proportion of projects				
		.1	.2	.3	.4	.5	.1	.2	.3	.4	.5
LMIC (902 projects)	1: Health systems and services	82	35	36	37	92	9%	4%	4%	4%	10%
	2: Social protections and basic services	71	30	98	55	123	8%	3%	11%	6%	14%
	3: Economic response and recovery	49	86	59	31	33	5%	10%	7%	3%	4%
	4: Macroeconomic policies and multilateral collaboration	29	12	6	2	5	3%	1%	1%	0%	1%
	5: Social cohesion and community resilience	43	107	23	30	25	5%	12%	3%	3%	3%
Rest of the database (4,040 projects)	1: Health systems and services	555	255	94	75	350	14%	6%	2%	2%	9%
	2: Social protections and basic services	207	188	336	327	621	5%	5%	8%	8%	15%
	3: Economic response and recovery	286	401	208	21	41	7%	10%	5%	1%	1%
	4: Macroeconomic policies and multilateral collaboration	27	15	12	9	15	1%	0%	0%	0%	0%
	5: Social cohesion and community resilience	178	382	140	139	298	4%	9%	3%	3%	7%

UNRR FUNDING TIMELINES

The total known value of the portfolio of all 4,942 research projects that address the pillars and priorities outlined in the UNRR is $915.5m, with the LMIC-focused projects totalling $104.2m, compared to $811.2m for the rest of the database. It is again important to re-emphasise the extent of the missing financial information for the tracker data, as mentioned in section #. In particular, while financial information was available for nearly two-thirds of projects in the UNRR portfolio, it was only possible to obtain the funding information for 36.5% of LMIC-focused projects.

Looking into the funding profile in more detail (Figure 20), despite the 'Social protections and basic services' being the most common pillar addressed by the projects in the database, the highest amount of *known* funding was spent on the 'Health systems and services' (nearly 50% of the known total).

Figure 20 - Known funding amounts by UNRR pillar
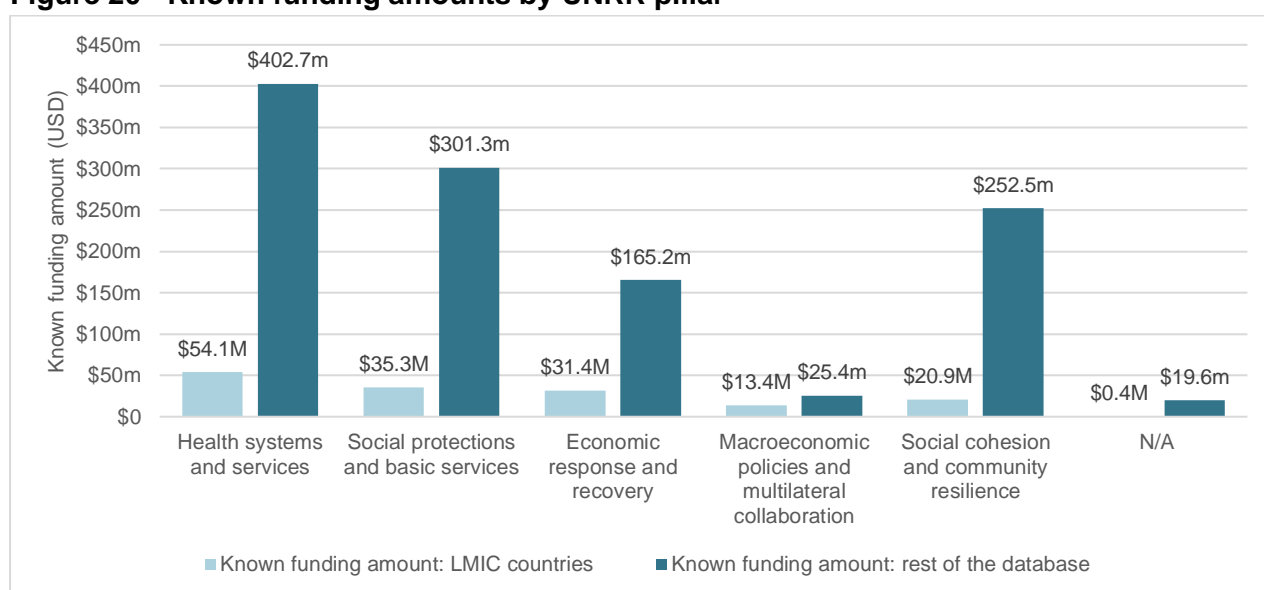
Note for Figure 20: Individual projects may be categorised against multiple UNRR pillars. Individual research projects may take place across multiple countries and therefore multiple income classification groups. Funding amounts available for 65.7% of projects addressing UNRR pillars (36.5% for subset of LMIC-focused projects).

Figures 21 and 22 demonstrate the cumulative growth of the UNRR portfolio in terms of the number of projects and known funding amounts. Summer 2020 saw the largest increases in general, with 2,502 of all the projects in the UNRR database being dated between May and September 2020 (57.8% of those with publication dates). In particular, more than 60% of projects with publication dates in the overall UNRR data were dated September 2020 (61.8%). However, 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 21 - Cumulative number of LMIC-focused projects compared to the rest of the database
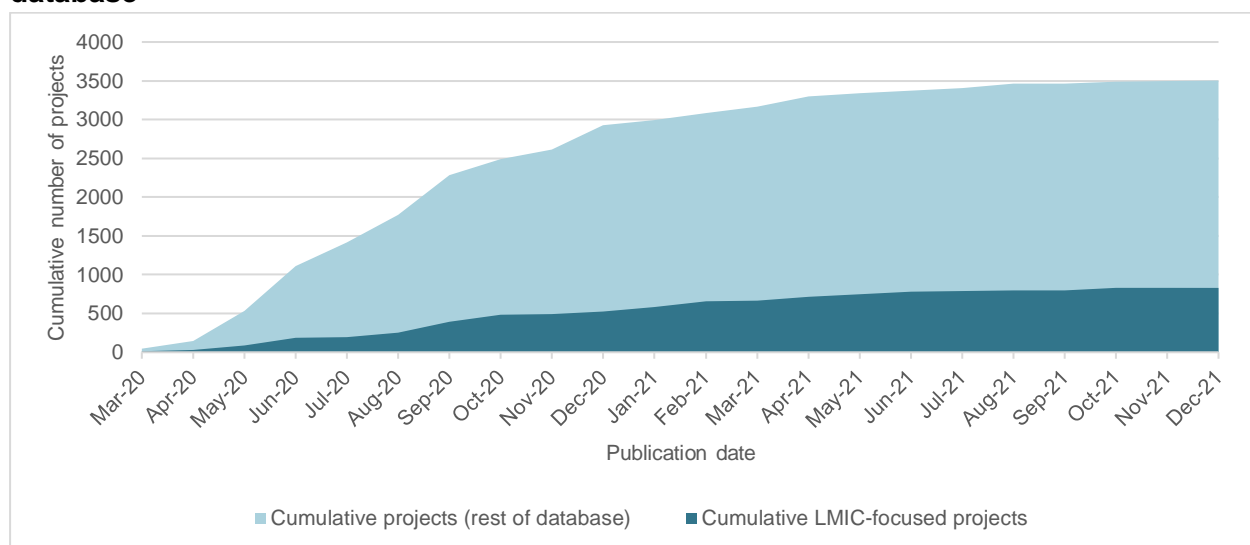
Note for Figure 21: *Publication date available for 87.7% of projects addressing pillars and priorities of UNRR (92% for LMIC-focused projects and 86.7% for the rest of the database). Individual research projects may take place across multiple countries and therefore multiple income classification groups.*

The entire funding profile of LMIC-focused projects was less than half of projects having publication dates in September 2020 for the rest of the database ($104.2m compared to $211.5m). In the same month, LMIC-focused projects only saw $21.4m awarded to projects (the second highest after $25.6m in October 2020).

Figure 22 - Cumulative value of projects for LMIC-focused projects and the rest of the database
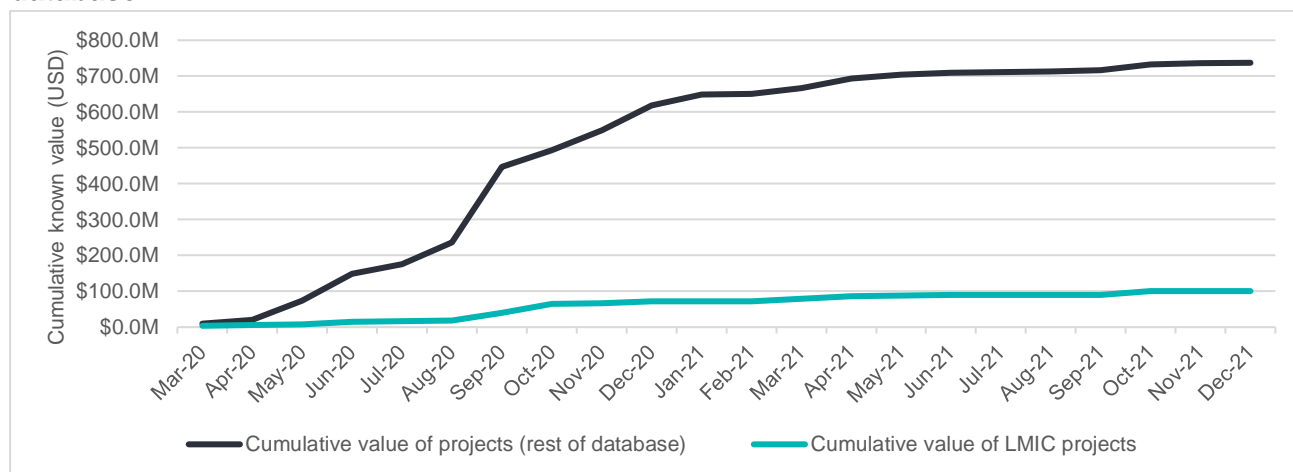
Note for Figure 22: *Publication date available for 87.7% of projects addressing pillars and priorities of UNRR (92% for LMIC-focused projects and 86.7% for the rest of the database). Individual research projects may take place across multiple countries and therefore multiple income classification groups.*

Looking at the timeline of the UNRR pillars for the LMIC-focused projects (Figure 23), the highest volume of projects for four of the five categories was September 2020, explaining the overall increase in this month. Only 'Social protections and basic services' did not see the same peak, with June and October 2020 both seeing slightly more projects categorised in this pillar. However, the 'Social protections and basic services' pillar sees a lot more growth after September 2020 than the other four pillars, and cumulatively has over a 100 more projects than the next most common pillar by December 2021.

Figure 23 - Timeline of projects by UNRR pillar for LMIC-focused research projects
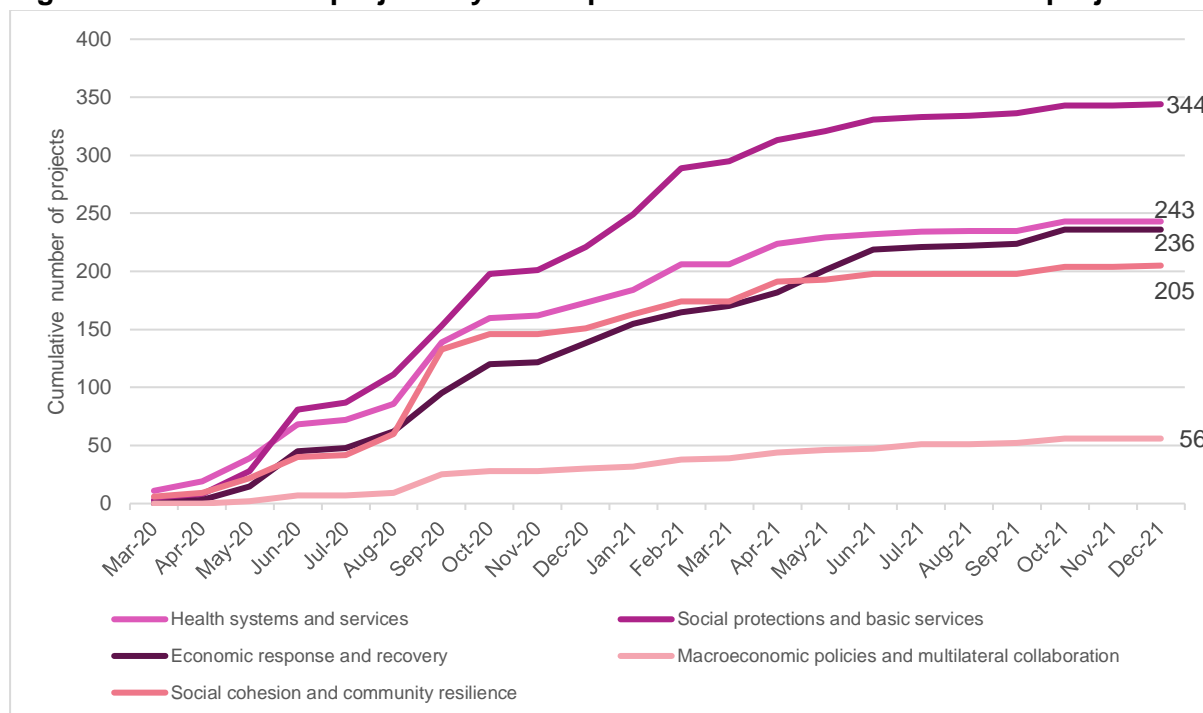
Note for Figure 23: *Publication date available for 87.7% of projects addressing pillars and priorities of UNRR (92% for LMIC-focused projects and 86.7% for the rest of the database). Individual research projects may take place across multiple countries and therefore multiple income classification groups. 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).*

FUNDERS OF UNRR PROJECTS

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 of projects involving at least one LMIC. The highest number of projects in the database were funded by UKRI, with 1,196 being coded against UNRR pillars (Table 13). Interestingly, a far greater proportion of the UKRI-funded projects (44.5%) were coded against the pillar on 'Economic response and recovery' than for the UNRR portfolio in its entirety (26.3%). When examining the list of the most prominent funders of research addressing the pillars and priorities of the UNRR in Table 13, 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. Seven of the top funders were also in the top ten for funders of projects mapped against multiple pillars.

Table 13 - Portfolio by UNRR pillar of top ten research funders (number of projects) of all research

| Funders	Health systems and services	Social protections and basic services	Economic response and recovery	Macroeconomic policies and multilateral	Social cohesion and community resilience	Total number of projects	Number of multi-pillar projects
UKRI	236	440	532	33	247	1,196	284
NSF	128	222	103	10	248	527	174
NIH	212	127	23	3	73	314	112
CIHR	122	131	14	2	49	209	94
DHSC/NIHR	69	36	7	1	19	105	29
Volkswagen Stiftung	20	30	19	8	46	103	25
ANR	27	31	16	0	22	81	24
CNRST	9	27	39	6	8	75	16
NWO	21	34	13	1	14	70	16
NMRC	24	31	13	4	3	68	12

***Note for Table 13:** Individual projects may be categorised against multiple UNRR pillars. 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: ANR** - Agence nationale de la recherche (National Research Agency); **CIHR** - Canadian Institutes of Health Research; **CNRST** - Centre National pour la Recherche Scientifique et Technique (National Center for Scientific and Technical Research Morocco); **DHSC** - Department of Health and Social Care; **NIH** - National Institutes of Health; **NIHR** - National Institute for Health Research; **NMRC** - National Medical Research Council (Singapore); **NSF** - National Science Foundation; **NWO** - Nederlandse Organisatie voor Wetenschappelijk Onderzoek (Dutch Research Council); **UKRI** - UK Research and Innovation*

Contrasting the information presented in table 13 with the most prominent funders in terms of those awarding the greatest number of projects involving at least one LMIC in the UNRR database (Table 14) reveals some notable findings. In particular, table 14 has a noticeable lack of funders based in high-income countries. For example, despite UKRI topping the ranking in terms of projects addressing the UNRR pillars in the database (table 13), the organisation is third in the ranking of LMIC-focused projects with only 5.1% of all their projects involving at least one LMIC (table 14), according to the database. Only 8.5% of the UNRR portfolio of those funders based in high-income countries in table 13 involve at least one LMIC – significantly lower than the proportion for the rest of the UNRR database (18.3%). Across all high-income country based funders more widely, this proportion stands at 12.6%.

Table 14 - Portfolio by UNRR pillar of top ten research funders (number of projects) of LMIC-focused research

Funders	Health systems and services	Social protections and basic services	Economic response and recovery	Macroeconomic policies and multilateral collaboration	Social cohesion and community resilience	Total number of projects
CNRST	9	27	39	6	8	**75**
NRF South Africa	30	19	9	5	40	**63**
UKRI	21	20	18	4	14	**61**
DPI Brazil	15	33	7	0	14	**53**
TUBITAK	5	29	6	6	5	**50**
IDRC	15	15	22	8	9	**49**
DHSC/NIHR	36	16	3	0	12	**47**
ICSSR	5	23	17	2	7	**45**
MINCYT Argentina	5	21	12	2	5	**37**
International Growth Centre	2	18	22	5	3	**31**

Note for Table 14: Individual projects may be categorised against multiple UNRR pillars. 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); DHSC – Department of Health and Social Care; DPI - Decanato de Pesquisa e Inovação (Dean of Research and Innovation); ICSSR - Indian Council of Social Science Research; IDRC - International Development Research Centre; MINCYT Argentina - Ministerio de Ciencia, Tecnología e Innovación (Argentina Ministry of Science, Technology and Innovation); NIHR - National Institute for Health Research; NRF – National Research Fund; TUBITAK - Türkiye Bilimsel ve Teknolojik Araştırma Kurumu (Scientific and Technological Research Council of Turkey)

Figure 24 illustrates 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. UKRI-funded projects totalled at least $245.2m but only 7.9% of these involved projects taking place in at least one LMIC (based on available inforamtion). NIH funded projects worth at least $219.1m, and less than 1% (0.8%) took places in LMICs. The third highest known value was funded by NSF ($111.7m), and this was equally low (0.9%) for LMIC-focused projects.

When looking at the highest combined totals for projects in LMICs, the highest value is just $28.2m (projects funded by IDRC). The next highest known portfolios belonged to the European Commission and UKRI (both between $19m and $20m).
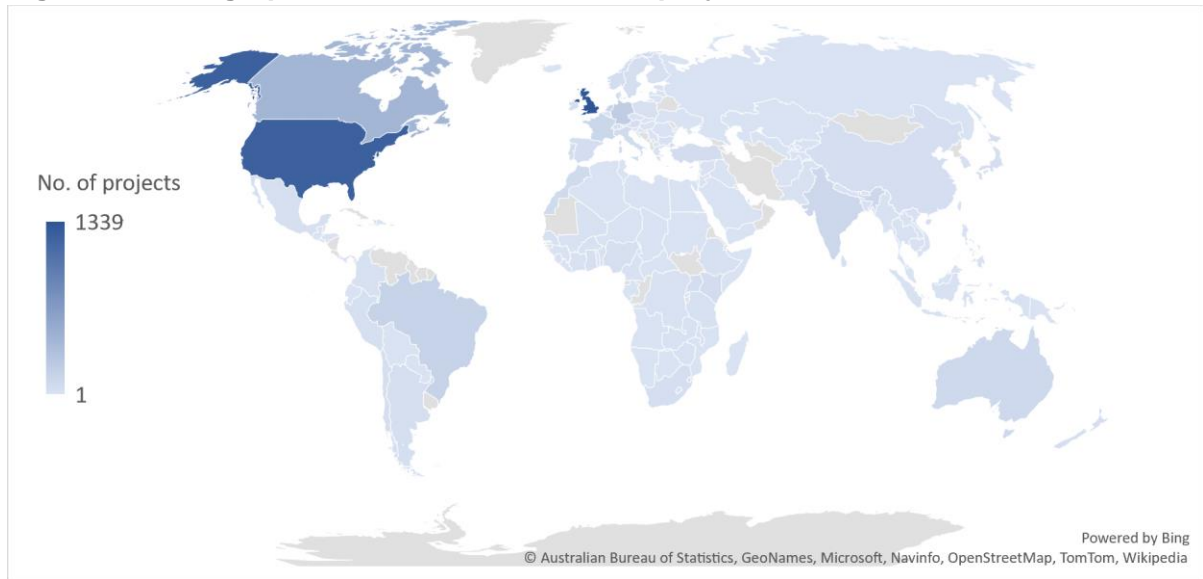
Figure 24 - Funders' award portfolios
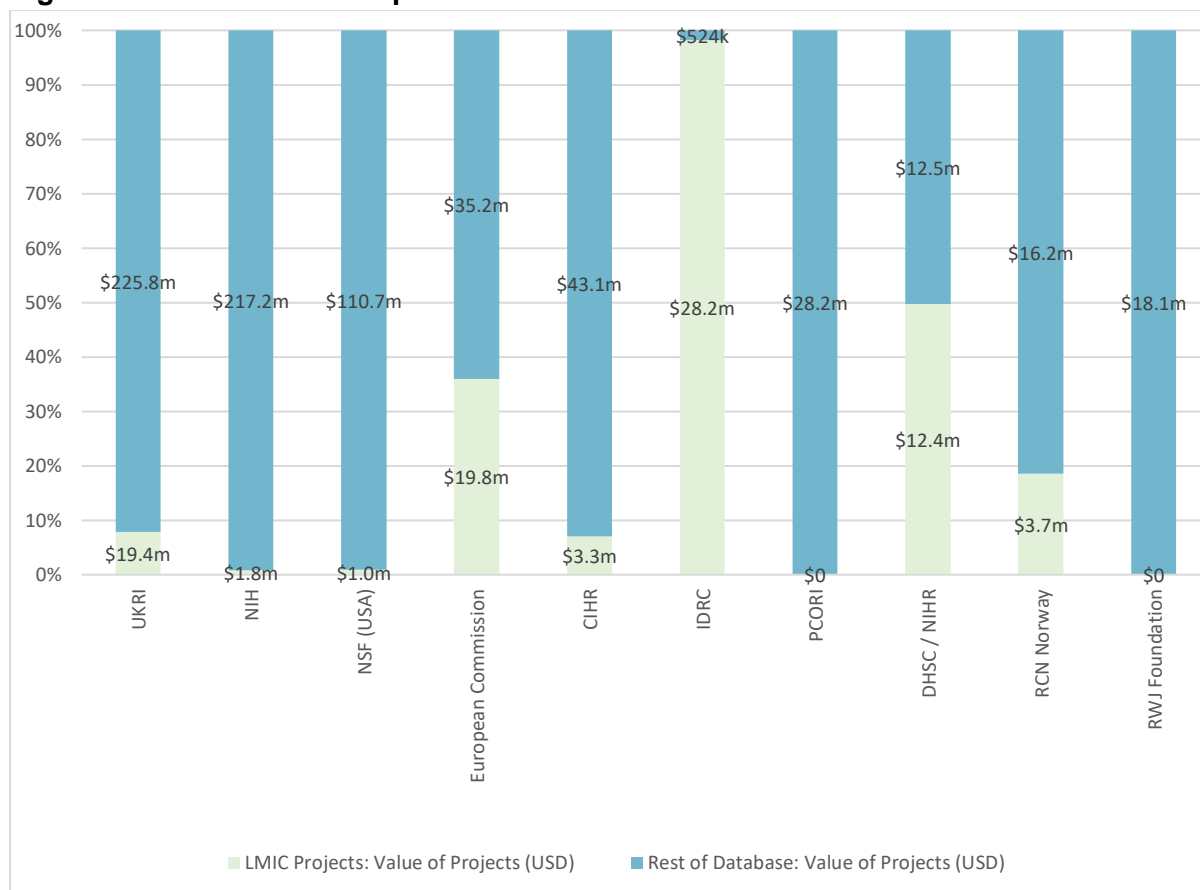
Note for Figure 24: *Individual research projects may take place across multiple countries and therefore multiple income classification groups.*

Abbreviations and acronyms: CIHR *- Canadian Institutes of Health Research;* **DHSC** *– Department of Health and Social Care;* **IDRC** *- International Development Research Centre;* **NIH** *- National Institutes of Health;* **NIHR** *- National Institute for Health Research;* **NSF** *- National Science Foundation;* **PCORI** *- Patient-Centered Outcomes Research Institute;* **RCN** *– Research Council of Norway;* **RWJ Foundation** *– Robert Wood Johnson Foundation;* **UKRI** *- UK Research and Innovation.*

REGIONAL PRIORITIES FOR UNRR

Figure 25 - Geographical distribution of UNRR projects

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Note for Figure 25: *Individual research projects may take place across multiple countries and therefore multiple income classification groups. Country information available for 98.6% of projects*

Research took place across 140 countries (this is based on projects with available location data). The majority of projects took place in at least one European or North American country (43.9% and 33.3%, respectively), with relatively small proportions taking place in Asia (8.3%), Africa (7.4%), Latin America and the Caribbean (6.6%) or Oceania (2.5%).

Figures 26- 31: Timeline of funding of UNRR pillars according to geographic region (by publication date of award information)
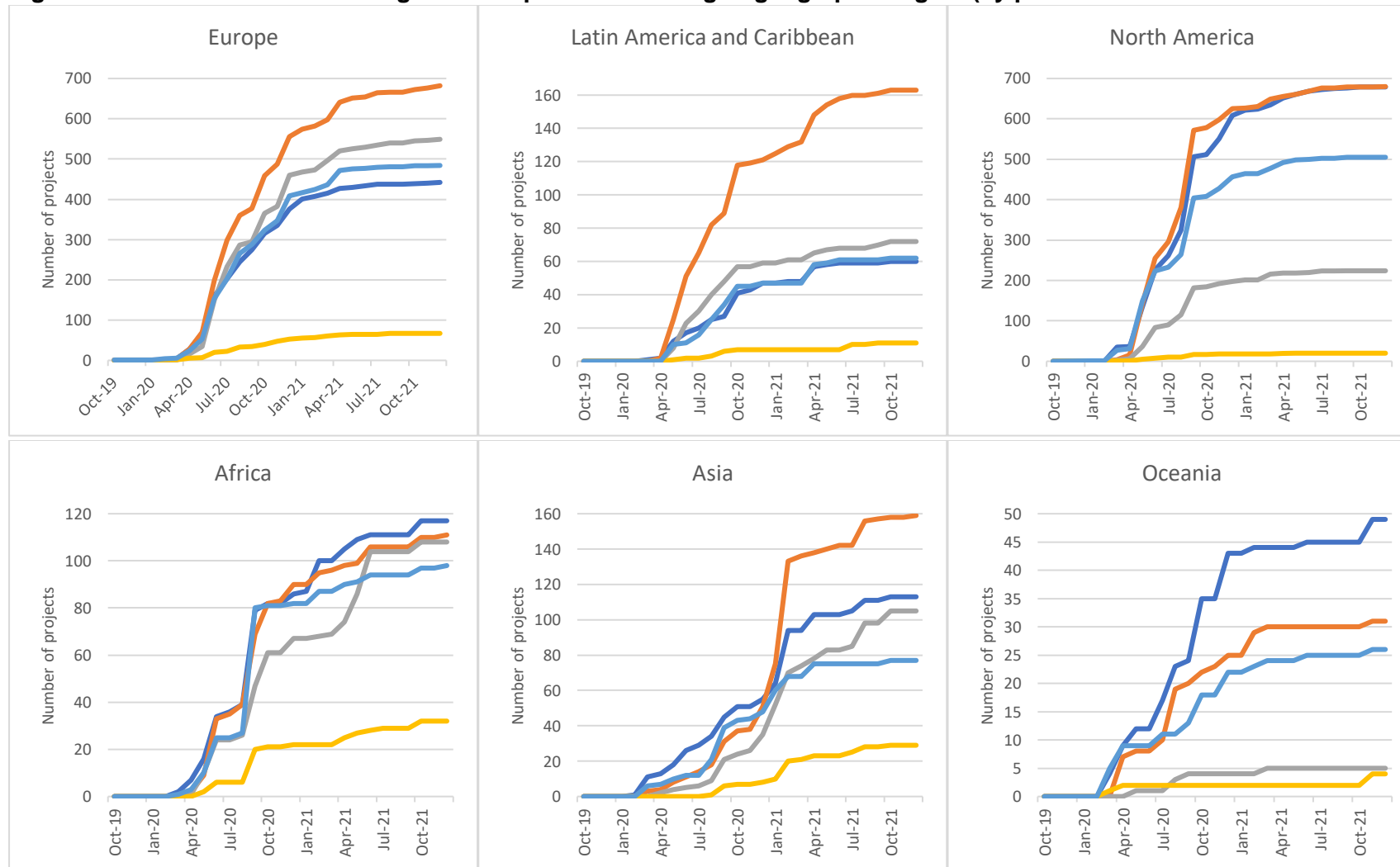
Note for Figures 26 – 31: Emphasis has been placed on presenting the number of projects as opposed to amounts awarded by funders as financial information was only available for 61.3% of all projects in entire database (39.5% for LMIC-focused projects).

— Health systems and services
— Social protections and basic services
— Economic response and recovery
— Macroeconomic policies and multilateral collaboration
— Social cohesion and community resilience

Figure 32 - Proportion of projects in each geographic location coded against each UNRR pillar

Health systems and services
Social protections and basic services
Economic response and recovery
Macroeconomic policies and multilateral collaboration
Social cohesion and community resilience
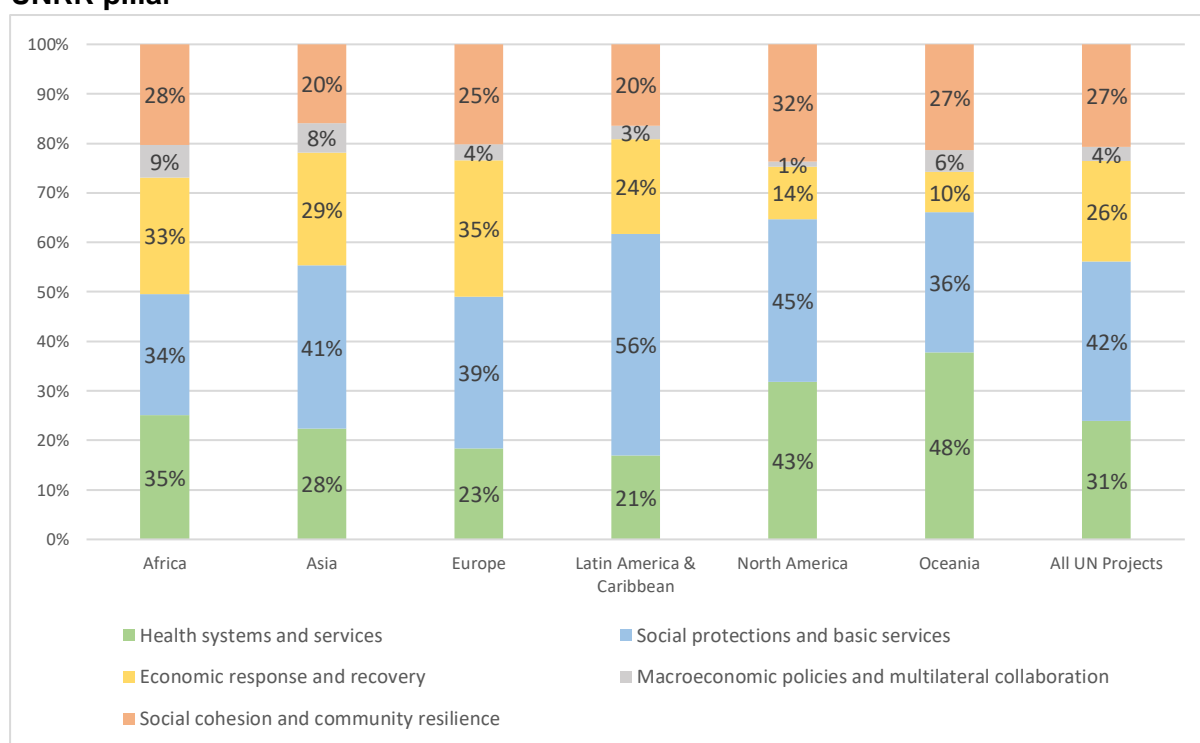
Note for Figure 32: *Individual projects may be categorised against multiple UNRR pillars .Individual research projects may take place across multiple countries and therefore multiple income classification groups. Emphasis has been placed on presenting the number of projects as opposed to amounts awarded by funders as financial information was only available for 61.3% of all projects in entire database (39.5% for LMIC-focused projects).*

Interestingly, although the pillar of 'Social protections and basic services' had the greatest number of projects across the UNRR database it its entirety, projects (at least partially) taking place in Africa and Oceania were less likely to focus on this, whereas those in Latin America and the Caribbean were much more likely (Figure 32). Looking more closely at the regional portfolios, figures 29 and 32 indicate that projects taking place in Africa exhibited a consistently varied portfolio over the time period in consideration with a more equitable allocation of projects across the pillars.

Examining the geographic spread of projects within each UNRR pillar (figure 33) reveals some large differences. Although 44% of *all* projects in the study were conducted in at least one European country, this proportion increases when only considering projects addressing the 'Economic response and recovery' pillar (58%). In contrast, 'Health systems and services' were more largely based in North America (46% compared to 33% of all projects and compared to 33% being based in Europe). Projects in the 'Macroeconomics policies and multilateral collaboration' category revealed interesting differences. Although the proportion of these projects based in Europe was roughly in line with the rest of the database, the proportion based in North America was a lot lower, and in turn the proportion based in Africa and Asia were disproportionate to the rest of the database: 18 and 17% compared to 7 and 8% of the database, respectively.

Figure 33 - Proportion of projects in each UNRR pillar coded against each region
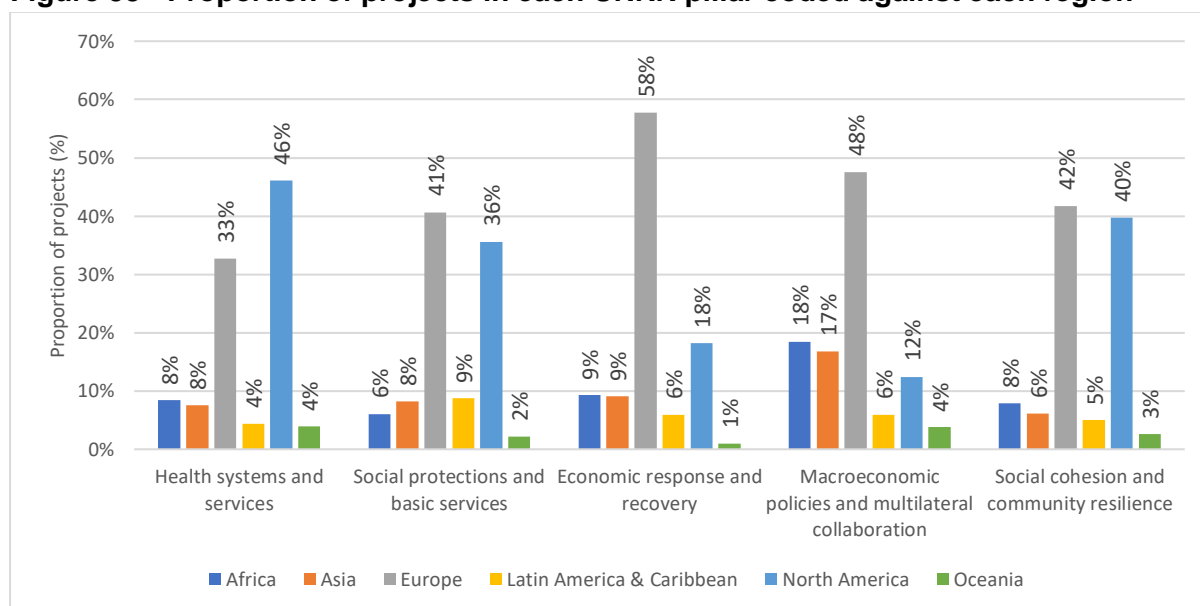
Note for Figure 33: Individual projects may be categorised against multiple UNRR pillars .Individual research projects may take place across multiple countries and therefore multiple income classification groups. Emphasis has been placed on presenting the number of projects as opposed to amounts awarded by funders as financial information was only available for 61.3% of all projects in entire database (39.5% for LMIC-focused projects).

MULTI-COUNTRY COLLABORATION AND STUDIES FOR UNRR PROJECTS

Only 248 projects (5%) of the overall 4,942 UNRR projects indicated taking place across multiple countries. Very few projects involved LICs *and* HICs, and although they were more common, a low number of projects involved MICs *and* HICs. This demonstrates a lack of collaboration on research aligned with the UNRR between high-, medium- and low-income countries. Table 15 shows the different breakdowns of projects.

Table 15 - Summary of types of multi-country collaborations (UNRR data)

Type of collaboration	Number of projects
Any multi-country collaboration	248
At least one least developed or low-income country	87
At least one middle-income country	141
At least one LMIC	167
At least one HIC	157
At least one middle-income country and at least one least/developed or low-income country	61
At least one least/developed or low-income country and at least one HIC	27
At least one middle-income country and at least one HIC	69

Note for Table 15: Individual research projects may take place across multiple countries and therefore multiple income classification groups. 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 multi-country projects in this analysis were UKRI (42 projects), IDRC (32) and NIHR (14). The top funders of multi-country projects with at least one LMIC were IDRC (32), UKRI (32) and NRS South Africa (11), according to the database.

UNRR INSTITUTIONAL ANALYSIS

In total, 2,182 institutions were designated as the lead institution conducting UNRR research in this analysis, 485 of which led on LMIC-focussed UNRR research. Of the overall 2,182 institutions, 1,858 (85.2%) were based in HICs, whereas 324 were based in LMICs. Just 54 (2.5%) projects were based in LICs. The institutions with the highest numbers of UNRR research projects were HIC-based institutions from the UK (829 institutions), USA (402) and Canada (91). However, institutions with the highest number of LMIC-focused projects were more often based in LMICs themselves; 65.4% of institutions were in LMICs (10.9% were LICs). The institutions with the highest numbers can be seen in Table 16.

Table 16 - Lead institutions with the greatest number of UNRR projects (top ten (11 for LMIC-focused projects because of four institutions having five each))

Top institution (number of projects)		Top institution (number of LMIC-focused projects)	
University College London	32	Universidade de Brasilia	19
Carleton University	28	Université Moulay Ismail	11
University of Oxford	25	University of Malawi	8
Dalhousie University, King's College London, New York University	24	Makerere University, University of Cambridge	7
University of Michigan	23	Université Mohammed V de Rabat, National School of Commerce and Management	6
McGill University, University of British Columbia	22	University of Pretoria, University of Toronto, UFES – Vitória, UFRGS	5
University of Southampton	21		

Abbreviation and acronyms: UFES - Universidade Federal do Espírito Santo (Federal University of Espírito Santo); UFRGS - Universidade Federal do Rio Grande do Sul (Federal University of Rio Grande do Sul)

Looking more closely at the portfolios of the lead institutions, Table 17 presents the institutions leading on the greatest number of projects under each of the pillars for both the overall and LMIC-focused portfolios. The Universidade de Brasilia is the lead institution for three of the five pillars, and Moroccan-based institutions led the other two (Université Moulay Ismail and National School of Commerce and Management). In the table, the only lead institutions for LMIC projects not in LMICs are the University of Toronto and the University of Washington. On the other hand, the lead institutions with the most projects overall are all based in the UK, the US or Canada.

Table 17 - Lead institutions with the greatest number of projects by UNRR pillar. Number of projects indicated in brackets

UNRR pillar	Top institution (number of projects)	Top institution (number of LMIC-focused projects)
Health systems and services	Dalhousie University (15)	Universidade de Brasilia (4) University of Toronto (4) University of Pretoria (4) Uni of Washington (4)
Social protections and basic services	University College London (19)	Universidade de Brasilia (11)
Economic response and recovery	Carleton University (9)	Université Moulay Ismail (6)
Macroeconomic policies and multilateral collaboration	London School of Economics (4)	National School of Commerce and Management (3)
Social cohesion and community resilience	University of Michigan (11)	Universidade de Brasilia (5)

SOCIAL SCIENCES AND ETHICS RESEARCH[5]

The two WHO priority areas of Social Sciences and Ethics Research were among the most complex and therefore challenging to analyse within the UKCDR & GloPID-R Project Tracker, with many social science projects not clearly aligning to the defined WHO sub-priorities. In 2021, COVID CIRCLE therefore partnered with the relevant WHO COVID-19 Working Groups to refine the analysis and understanding of research funded in these areas during the pandemic.

A total of 4,823 research projects were classified under the social sciences priority area worth (at least) $908.76m – accounting for approximately 16% of the total known funding. Financial information was available for 60% of all social science projects.

Figure 34 - Projects categorised to the WHO COVID-19 Roadmap social sciences sub-priority areas and total available funding amount

Number of Projects		Value of Portfolio
802	Uptake of Public Health Measures	$309m
133	Clinical Care and Health System	$38m
400	Media and Communication	$162m
174	Engagement and Partnership	$141m
17	Sexual and Reproductive Health	$3m
21	International Cooperation	$25m
1676	N/A	$422m

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[5] The work in this section was undertaken as the dissertation for two students of the University of Oxford International Health and Tropical Medicine under the supervision of Dr Alice Norton with Dr Nina Gobat (WHO) for Social Sciences and Katherine Littler (WHO) for Ethics.

The in-depth analysis of social sciences research focused on those projects taking place in (at least one) LMIC (accounting for 24% of all projects). There were 984 projects funded in LMICs, but only one-third have funding details available. It was found that 15% of these projects were conducted across multiple countries, mainly in those countries designated as low-income and least developed. A statistically significant difference in the targeted population between HICs and LMICs were found where HICs have implemented projects focusing more on vulnerable populations.

Mapping projects against LMIC priorities, as defined in the previous collaborative study conducted by UKCDR, AAS and TGHN[6], showed that 75% of social sciences projects were aimed at 'understanding infections among vulnerable populations', 'addressing myths and mistrust in public health messages', and 'adhering to and trust in public health interventions'. New coding categories, namely 'art and culture', 'gender-based violence', and 'wellbeing and care' were identified as not aligning to these previously defined priorities and are distinct from all previous categories.

In terms of ethics-focused, while there are existing ethical guidance frameworks for outbreaks based on lessons learnt over the years, there was need to further conduct ethics-focused research in the context of COVID-19. This is due to the differences in the nature of the outbreak and other developments over the years.

Despite the WHO sub-priorities being very specific and therefore limiting what projects could be coded against, the majority of the projects aligned to the sub-priority areas under the ethics considerations priority area. Additionally, the new suggested categories ('public health surveillance', 'use of digital tools in COVID-19 research', 'decision-making dilemmas' and 'health disparities') align well with the research gaps and opportunities identified in the R&D Blueprint team reports[7,8,9]. The findings also emphasise the importance of collaboration across thematic or priority areas in the research response to the pandemic. Over half (56%) of the ethics-focused projects were interdisciplinary projects with multiple components. The majority of these, in turn, aligned with the social sciences thematic area as well.

Teasing out ethics-focused research from other aspects of social sciences was found not to be straightforward. An inclusion criterion for ethics-focused research was therefore suggested to reduce subjectivity in coding.

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[6] UKCDR (2020). Global research community asks for the right research in the right places for COVID-19. UK Collaborative on Development Research. Available from https://www.ukcdr.org.uk/news-article/global-research-community-asks-right-research-right-places-covid-19

[7] Research and Development Team, World Health Organization (2021) COVID-19 Research and Innovation Achievements. Available at: https://www.who.int/publications/m/item/covid-19-research-and-innovation-achievements

[8] WHO R&D Blueprint Team (2021) COVID-19 vaccines: Knowledge gaps and research priorities WHO ad hoc consultation. Available at: https://www.who.int/publications/m/item/covid-19-vaccines-knowledge-gaps-and-research-priorities---who-ad-hoc-consultation

[9] WHO R&D Blueprint Team (2022) COVID-19 Research and Innovation Powering the world's pandemic response-now and in the future. Available at: https://www.who.int/publications/m/item/covid-19-research-and-innovation---powering-the-world-s-pandemic-response-now-and-in-the-future

The inclusion criteria designed through discussion with part of the Health Ethics and Governance Unit, encompassed four broad areas that captures all ethics concepts:

1. Ethics-focused research.
2. Seeks to provide information/data/knowledge essential for ethics (applied ethics).
3. Peripheral projects related to ethics intuitively and have ethical relevance, e.g., human rights, law, and treaties (Normative work).
4. Not ethics.

This together with use of a coding matrix and validation is important for optimisation of the coding process for the ethics research.

This in-depth analysis indicated limited projects funded under the ethics considerations priority area. This suggests that the research needs set for ethics-focused research for COVID-19 have not been met and the subsequent reports by the R&D Blueprint team indicate remaining research needs and emerging gaps[10]. It is imperative in LMICs that ethics research projects are prioritised, including studies with vulnerable populations, and the need to be considered in the local context. There is a need for high-quality and standardised data to study human sub-populations in COVID-19. For recovery to be realised, international collaboration is essential to maximising the impact of investments in these research priorities and minimising gaps across the countries. With new themes in social sciences research and changing priorities, the traditional paradigm of funding the research require restructuring to ensure pandemics like COVID-19 can be prioritised.

Figure 35 - Projects categorised to the WHO COVID-19 Roadmap ethics considerations sub priority areas and total funding amount

Number of Projects		Value of Portfolio
15	Ethical Governance	$4m
59	Public Health Communication, 'Infodemics'	$6m
19	Restrictive Public Health Measures	$3m
16	Sustained Education and Capacity Building	$5m
77	Articulate Ethical Issues to Existing Ethical Standards	$15m

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[10] See footnotes 7, 8, and 9.

NOTES ON DATA

This analysis is based on the April 2022 version of the UKCDR and GloPID-R COVID-19 research project tracker – the same dataset used to conduct the vertical analysis in Section 3. The dataset has been divided into three subsets:

- Projects funded by at least one UKCDR member.
- Projects funded at least one GloPID-R member/observer.
- 'All other funders' (which comprises of projects awarded by the remaining funders).

The member organisations for the first two sets of data are listed below:

UKCDR Member Organisations with Tracker Data (April 2022 version of the database features data from six of seven member organisations)**:**

- *BEIS[11]*
- *DEFRA*
- *DHSC/NIHR*
- *FCDO*
- *UKRI*
- *Wellcome*

GloPID-R Member and Observer Organisations with Tracker Data (April 2022 version of the database features data from 28 of 40 member/observer organisations)[12]**:**

- *AAS*
- *AMED Japan*
- *ANRS*
- *BMBF*
- *BMGF*
- *CEPI*
- *CIHR*
- *CONACYT (Mexico)*
- *DHSC/NIHR*
- *EDCTP[13]*
- *European Commission*
- *FAPESP*
- *FCDO*
- *ICMR*
- *IDRC*
- *Institut Pasteur*
- *ISCIII*
- *Italian Ministry of Health*
- *MINCYT (Argentina)*
- *UKRI- MRC*
- *NHMRC*
- *NRF Korea*
- *RCN*
- *SAMRC*
- *SNSF*
- *Wellcome*
- *WHO*
- *ZonMw*

In addition to the caveats and limitations noted in Section 3 and Annex B, this analysis has further considerations. Firstly, as can be seen from the list of member organisations above, four organisations are members of both UKCDR and GloPID-R – namely, DHSC/NIHR, FCDO, UKRI-MRC, and Wellcome. These two subsets of data should, therefore, not be thought of as being mutually exclusive.

It should also be noted that, to be included in either the UKCDR or GloPID-R data subset, a project is required to be funded by at least one of the corresponding member organisations.

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[11] Though not included among the list of funders in the UKCDR and GloPID-R tracker, the database features a significant number of BEIS-funded research projects as UKRI is funded through BEIS' science budget.

[12] Among the GloPID-R member organisations without data in the April 2022 version of the tracker is the Rwandan National Council for Science and Technology whose data (17 projects totalling $996k) has since been added to the online version of the tracker.

[13] Since the completion of the analysis, more data has been obtained on the grants made by EDCTP as part of their Emergency Funding Mechanism which now reflects a total value of $15.7m. While the analysis has not been amended to reflect this update due to time considerations, the UKCDR and GloPID-R COVID-19 Funded Research Project Tracker contains the latest data on this

This includes projects that are co-funded by multiple organisations, even if not *all* of them are members of either UKCDR or GloPID-R. As data on how funding amounts are divided between co-funding organisations is not available, grant amounts will therefore reflect the total value of those projects across all co-funding organisations, rather than the isolated contribution of the UKCDR and/or GloPID-R member organisation.

The size and (known) value of each of the three subsets of data can be found in Table 18, below:

Table 18 - Summary of COVID-19 Research Data Subset by Funder Group

	Data Subset		
	UKCDR Members	**GloPID-R Members/Observers**	**All Other Funders**
Total Number of Projects	3,561	2,499	10,722
Known Value of Portfolio	$1.2 billion	$2.7 billion	$2.8 billion

Note for Table 18: Funding amounts were available for 61.3% of all projects in the database as not all funders provided financial information (available for 85.0% of UKCDR member projects, 67.6% of GloPID-R member projects, and 52.4% of projects from all other members). A total of 429 projects worth (at least) $367.4m are part of both the UKCDR and GloPID-R data subsets.

WHO COORDINATED GLOBAL RESEARCH ROADMAP: PRIORITY AREAS

UKCDR Members Portfolio

Looking at the distribution of projects across the WHO priority areas (Figure 36), in terms of the *number* of projects, it is interesting to note the greater emphasis placed by UKCDR members on 'Infection prevention and control', which ranks second among the nine priority areas, relative to the portfolio of all other funders (ranking fifth). This is largely a result of the funder with the greatest number of 'Infection prevention and control' projects, UKRI (funder of 401 of all 1,814 projects in the entirety of the tracker under this priority area), being included among UKCDR members.

Interestingly, while the priority area 'Social sciences in the outbreak response' ranks first for both the UKCDR and all other funders data subsets (representing approximately one third of the number of projects under each portfolio), it can be seen that projects in the UKCDR portfolio are more highly concentrated in a smaller number of priority areas than for all other funders. For UKCDR members, the social sciences priority area contains 2.7 times the number of projects of the second most commonly-awarded priority area – representing a notably greater difference observed for all other funders (1.5). More widely, for the UKCDR data subset, only three of the nine WHO priority areas contain at least 10% of the total number of projects under that portfolio – far lower than the six such priority areas for the portfolio of all other funders.

Regarding the value of these projects, only the 'Clinical characterization and management' priority area ranked among the top three for both funder groups in terms of known funding amounts – coming in at third for UKCDR members ($171.7m) and first for all other funders ($927.6m). While there are few similarities between the UKCDR and all other funders subsets of data in terms of the WHO priority areas with the greatest amount of funding, the three least funded priority areas are the same for both sets of data (namely 'Infection prevention and control', 'Ethics considerations for research', and 'Animal and environmental research on the

virus origin, and management measures at the human-animal interface' - with the latter constituting for, at most, 0.5% of a given group's portfolio).

Figure 36 – Proportion of COVID-19 Research Projects Classified Against Priorities Outlined in WHO Coordinated Global Research Roadmap for the portfolios of UKCDR members, GloPID-R members, and all other funders.

Number of Projects	WHO Priority Area	Known Value of Projects
8.6%	Virus: natural history, transmission and diagnostics	14.4%
24.2%		13.4%
23.0%		31.5%
0.5%	Animal and environmental research...	0.4%
1.2%		0.4%
0.7%		0.5%
5.4%	Epidemiological studies	9.2%
12.8%		8.9%
10.7%		9.7%
10.4%	Clinical characterization and management	14.8%
22.4%		19.5%
20.5%		33.4%
11.8%	Infection prevention and control...	6.8%
7.8%		3.6%
11.5%		8.8%
4.3%	Candidate therapeutics R&D	7.1%
16.8%		12.3%
11.6%		21.2%
2.1%	Candidate vaccines R&D	23.4%
6.8%		47.9%
3.8%		18.6%
0.8%	Ethics considerations for research	1.0%
1.5%		0.6%
1.7%		0.7%
31.6%	Social sciences in the outbreak response	21.6%
33.3%		12.6%
33.9%		18.9%

UKCDR Members (3,561 projects worth at least $1.2b)	
GloPID-R Members (2,499 projects worth at least $2.7b)	
All Other Funders (10,722 projects worth at least $2.8b)	

Note for Figure 36: *Individual research projects may be assigned to multiple WHO priority areas. Funding amounts were available for 61.3% of all projects in the database as not all funders provided financial information (available for 85.0% of UKCDR member projects, 67.6% of GloPID-R member projects, and 52.4% of projects from all other members).*

GloPID-R Members Portfolio

When considering how the portfolio of GloPID-R members compares to that of all other funders in the database in terms of the distribution of projects across the WHO priority areas, Figure 36 demonstrates a high degree of similarity between the two subsets. In particular, the respective rankings of the nine priority areas in terms of the number of projects for both portfolios are virtually identical – with the only difference being the 'Epidemiological studies' and 'Infection prevention and control' priority areas which alternate between being ranked fifth and sixth between the two data subsets.

Additionally, the two subsets of data demonstrate further similarity when examining the proportional make up of each portfolio by priority area. Of the 2,499 projects funded by GloPID-R members in the dataset, 16.8% of these projects are classified against the 'Candidate therapeutics R&D' priority area - 5.2 percentage points more than that of all other funders. This represents the greatest deviation between the two subsets of data for any given priority area, with the deviations for the remaining eight priority areas averaging at just 1.6 percentage points.

In terms of the value of these projects, Figure 36 shows that, while the 'Candidate vaccines R&D' priority area ranks first in terms of known funding amounts for GloPID-R members ($1.3b), the exclusion of these funders from the rest of the database (most notably CEPI whose $1.2b accounts for 57.3% of the known $2.0b-worth of projects addressing this priority area) means that 'Candidate vaccines R&D' ranks fifth for all other funders. Interestingly, the opposite effect occurs when considering the known value of projects addressing the 'Candidate therapeutics R&D' priority area – ranking higher for all other funders (third with $588.0m) than for GloPID-R members (fifth with $329.2m).

While the ranking of priority areas between the GloPID-R and all other funders portfolios are not as similar for the known value of projects as they are with the number of projects, five of the nine priority areas are still ranked the same for both subsets – including the placement of the bottom four priority areas. This high degree of similarity described in this section is notable given that the GloPID-R member portfolio contains less than one quarter of the number of projects included in the portfolio of all other funders.
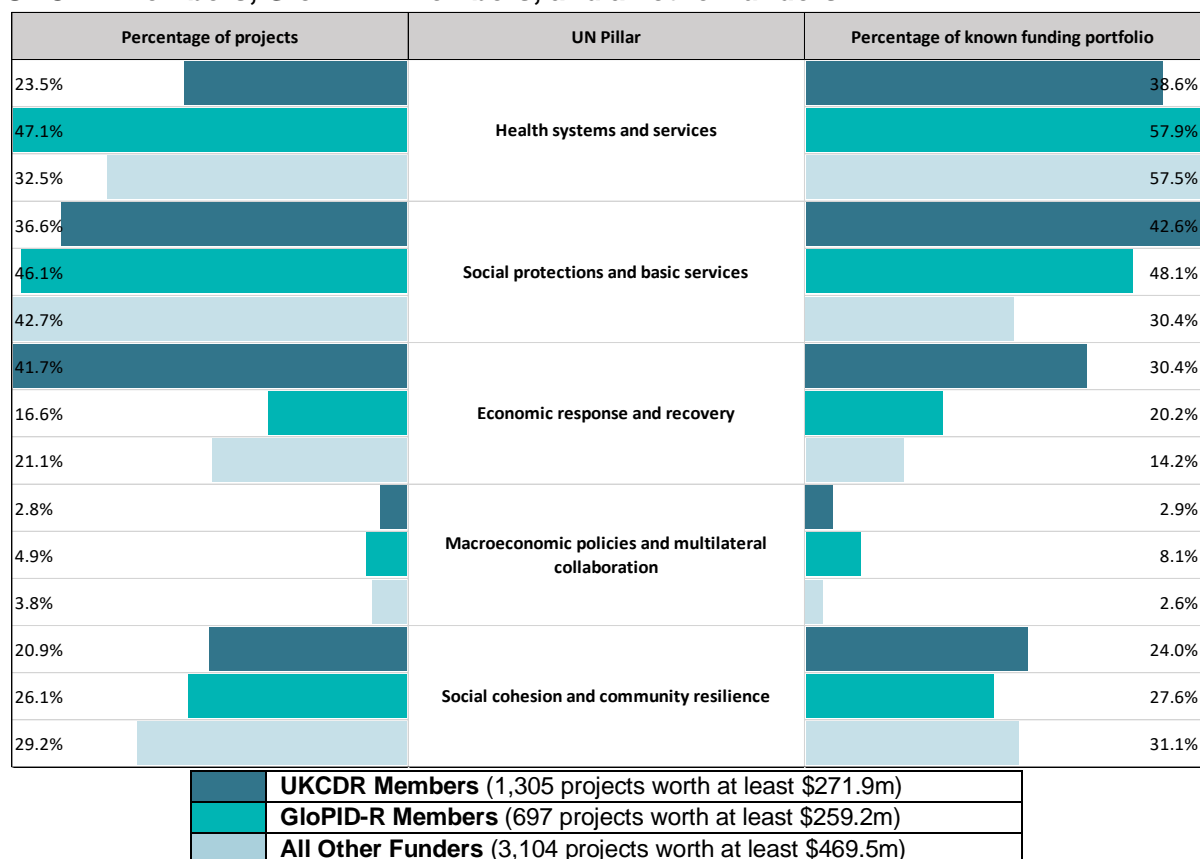
UN RESEARCH ROADMAP FOR THE COVID-19 RECOVERY: PILLARS

UKCDR Members Portfolio

Looking at the distribution of projects across the UN Pillars (Figure 37), it is interesting to note the focus of UKCDR member organisations on 'Economic response and recovery programs' (544 projects accounting for 41.7% of projects, ranking first among all pillars), compared to the portfolio of all other funders (655 projects, accounting for 21.1% of projects, ranking fourth). More widely, there are very few parallels between the UKCDR members and all other funders data subsets when contrasting the number of projects under the UN Pillars for each of the portfolios. Apart from the pillar on 'Macroeconomic policies and multilateral collaboration' being ranked last for both data subsets, none of the (remaining four) pillars share the same ranking between the portfolios of UKCDR members and all other funders. To emphasise the lack of commonality further, there are significant differences in the proportion of projects under each pillar for the two data subsets ranging from a 6.1 percentage point difference at best (for the 'Social protections and basic services' pillar) to a 20.6 percentage point difference (for the 'Economic response and recovery programs' pillar).

This lack of similarity is again apparent upon analysis of the known value of the projects in the UKCDR and all other funders data subsets that address the UN Pillars – with three of the pillars exceeding a 10-percentage point difference in terms of how the overall value of the UKCDR and all other funders UN portfolios are respectively distributed across the five pillars.

Figure 37 - Proportion of COVID-19 Research Projects Classified Against Pillars Outlined in UN Research Roadmap for the COVID-19 Recovery for the portfolios of UKCDR members, GloPID-R members, and all other funders.

Percentage of projects	UN Pillar	Percentage of known funding portfolio
23.5%	Health systems and services	38.6%
47.1%		57.9%
32.5%		57.5%
36.6%	Social protections and basic services	42.6%
46.1%		48.1%
42.7%		30.4%
41.7%	Economic response and recovery	30.4%
16.6%		20.2%
21.1%		14.2%
2.8%	Macroeconomic policies and multilateral collaboration	2.9%
4.9%		8.1%
3.8%		2.6%
20.9%	Social cohesion and community resilience	24.0%
26.1%		27.6%
29.2%		31.1%

UKCDR Members (1,305 projects worth at least $271.9m)
GloPID-R Members (697 projects worth at least $259.2m)
All Other Funders (3,104 projects worth at least $469.5m)

Note for Figure 37: *Individual research projects may be assigned to multiple UN Pillars. Funding amounts were available for 61.3% of all projects in the database as not all funders provided financial information (available for 85.0% of UKCDR member projects, 67.6% of GloPID-R member projects, and 52.4% of projects from all other members).*

GloPID-R Members Portfolio

From Figure 37, it can be seen that, as with the case of the WHO priority areas, the ranking of the UN Pillars, in terms of the number of projects, for the GloPID-R and all other funders portfolios exhibit a high degree of similarity – matching on three of the five pillars (with the 'Health systems and services' and 'Social protections and basic services' pillars alternating between first and second ranked positions between the two data subsets). Furthermore, the two subsets also demonstrate a similar distribution across the pillars, deviating by no more than 4.5 percentage points for four of the five pillars.

Although the same overall finding can be presented for the ranking of UN Pillars when examining the known value of these projects, the distribution across the pillars for the two data subsets reveals that, while the pillar on 'Macroeconomic policies and multilateral collaboration' ranks last for both groups of funders, the known value of these projects as a proportion of the overall UN portfolio of GloPID-R members is more than three times that of all other funders. This can partially be explained by the inclusion of projects funded by the European

Commission in the GloPID-R subset who awarded the largest amount of (known) funding for this pillar in the overall dataset.

FUNDING OVER TIME

When considering the timeline of when funds were awarded, Figures 38 and 39 show that funders across the three groups were most active in granting awards between April and September of 2020.

UKCDR Member Portfolio

For UKCDR members, funding activity was at its highest during the summer of 2020 which featured the three months with the greatest number of projects, namely July 2020 (796 projects, 22.4% of all projects), June 2020 (563, 15.8%) and August 2020 (520, 14.6%). Of the projects with publication dates, more than 80% of the total number of projects across the period in consideration had been awarded by December 2020. August 2020 also saw the greatest increase in the (known) funding amount of these projects, totalling $329.6m in value – the only month with a known funding amount of at least $100m based on available data (in contrast to six occurrences experienced by the all other funder portion of the database).

GloPID-R Member Portfolio

For GloPID-R members, according to the data, the peak in funding activity largely occurred early on in the pandemic relative to all other funders, with more than one third (37.7%) of members' collective funding total over the period in consideration having been awarded by April 2020 – a month that features more than half a billion in funding, owing largely to the $399.8m invested by CEPI (and more than four-times the amount of known funding of the month with the second highest total). This contrasts to the 3.2% of the overall totals awarded by all other funders by April 2020, which did not reach the same proportion of funding as GloPID-R members until August of that year (based on available data).

Similarly, in terms of the number of projects, by June 2020, GloPID-R members had already collectively awarded 40.4% of the total number of projects over the time period in consideration according to the data – contrasting to the 27.2% of the overall number of projects awarded by all other funders.

Figure 38 - Cumulative Number of Projects Funded by Month of Funder Database Release For UKCDR members, GloPID-R members, and all other funders
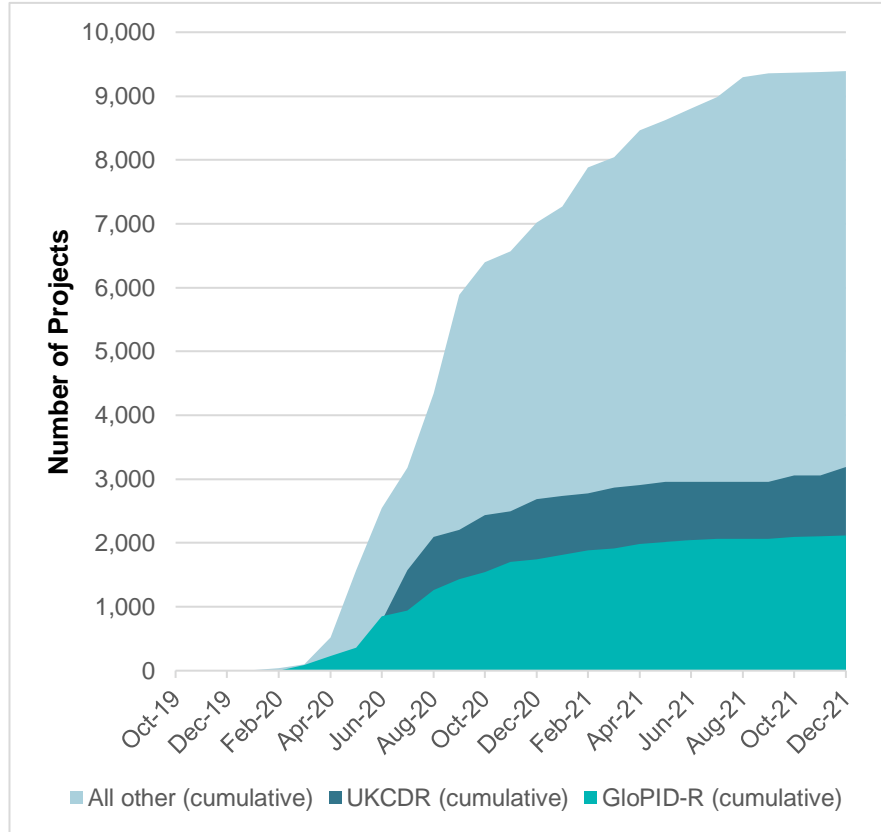
Note for Figure 38: Dates of database release were available for 87.3% of all projects in the dataset (available for 89.6% of UKCDR member projects, 84.8% of GloPID-R member projects, and 87.6% of projects from all other members).

Figure 39 - Cumulative Known Funding Amounts of Projects Funded by Month of Funder Database Release For UKCDR members, GloPID-R members, and all other funders
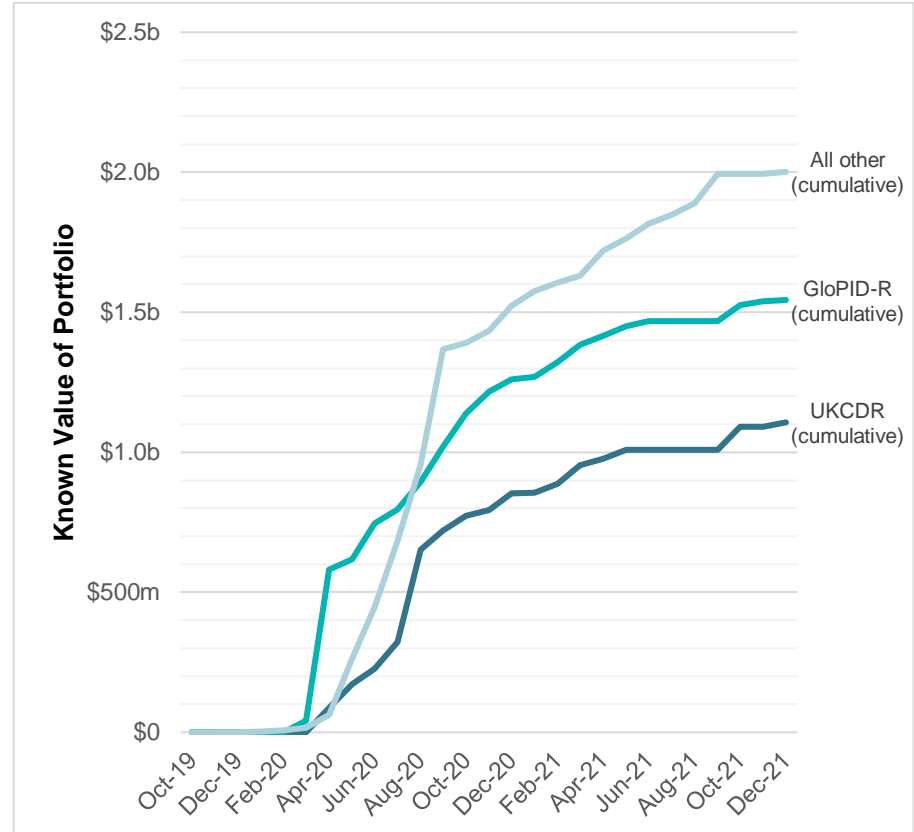
Note for Figure 39: Funding amounts were available for 61.3% of all projects in the database as not all funders provided financial information (available for 85.0% of UKCDR member projects, 67.6% of GloPID-R member projects, and 52.4% of projects from all other members).
Dates of database release were available for 87.3% of all projects in the dataset (available for 89.6% of UKCDR member projects, 84.8% of GloPID-R member projects, and 87.6% of projects from all other members).

LOCATION OF RESEARCH PROJECTS

UKCDR Members Portfolio

Looking at Figure 40, it is immediately clear to see the high concentration of projects funded by UKCDR member organisations that list the UK among the countries where a given research project is taking place (94.9% of projects with data on individually named countries in the dataset), which is expected, given that each UKCDR member organisation is based in the same country. For the all other funders data subset, the concentration of projects at least partially taking place in the country with the greatest number of projects, the USA, is notably less at 35.4% (Figure 42).

More generally, the overall portfolio of UKCDR members offers less geographic diversity than that of all other funders in the dataset. Across the 3,561 projects funded by UKCDR members, a total of 73 countries were listed as a location where research has been taking place – which is only just over half of the total from all the other funders in the database (137). However, this is probably explained at least in part by the greater geographic diversity in the location of research funders in the case of the latter subset of data, as well as the difference in size between the two subsets.

Further analysis, as presented in Table 19, reveals a disparity in regional representation in the portfolio of each funder subset. Available information demonstrated that only two of the 18 regions presented in the data contain at least 2% of the UKCDR member-funded projects (a figure which decreases to just one region when increasing the threshold to 5% of projects). For the subset of data of all other funders, nine regions contain at least 2% of projects in this portfolio (and a total of five regions when the threshold is increased to 5%). Additionally, a total of 15 regions contains less than 1% of the projects included under the UKCDR member portfolio – three times as much as that from the data subset of all other funders.

GloPID-R Members Portfolio

Figures 41 and 42 show the extent to which the global membership of GloPID-R is reflected in the data, as the portfolio of research projects funded by member organisations exhibits a high degree of internationality. Despite containing far fewer projects than the subset of all other funders data, GloPID-R member-funded research has taken place across 135 countries – only two fewer than the data subset of all other funders. In addition to this, 10.2% of projects funded by GloPID-R member organisations in the database (with location data) take place across multiple countries – a significantly higher proportion than the portfolio of all other funders (2.5%).

Looking at the regional distribution of where projects in the dataset are taking place, Table 19 shows a more even distribution of projects across regions for GloPID-R member-funded projects than is presented in the above section. Four of the 18 regions presented in Table 19 feature at least 15% of the projects funded by GloPID-R members (with relatively little variation between the 18 regions), where data is available. This compares to just two regions for all other funders which additionally features much greater variation across the 18 regions.
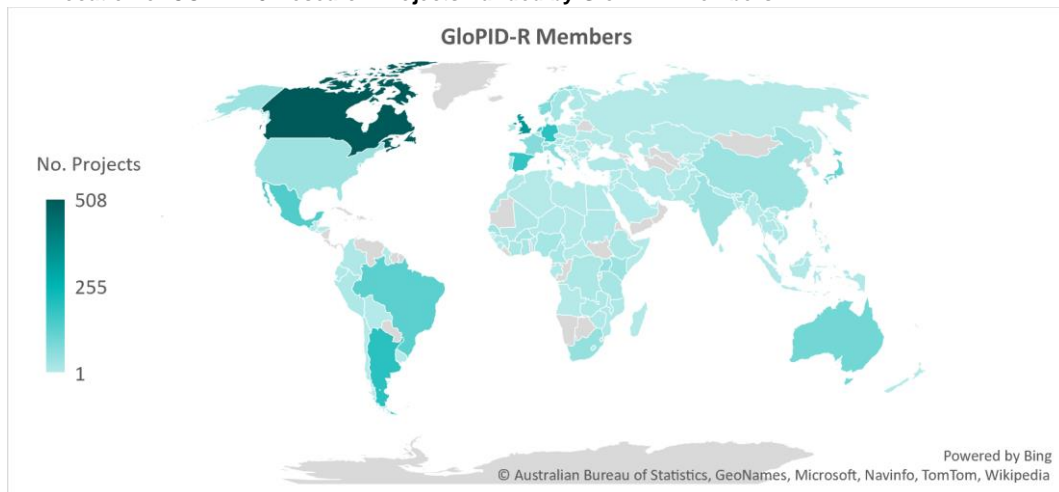
Using wider geographic thresholds, projects (at least partially) taking place in Africa make up 10.0% of the portfolio of GloPID-R member-funded projects with location data – more than double the rate experienced by the all other funders portion of the dataset (4.5%). This proportion is almost identical to that of projects (at least partially) taking place in Asia, accounting for 9.7% of GloPID-R member-funded projects in the dataset (compared to 21.6% of available data for all other funders).

Figure 40 - Location of COVID-19 Research Projects Funded by UKCDR Members

UKCDR Members

No. Projects

3,231

1,616

1

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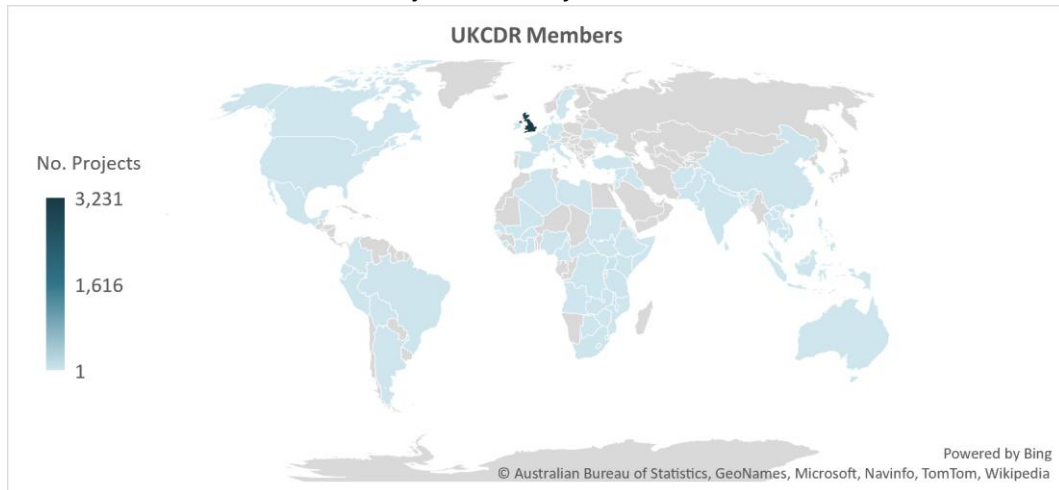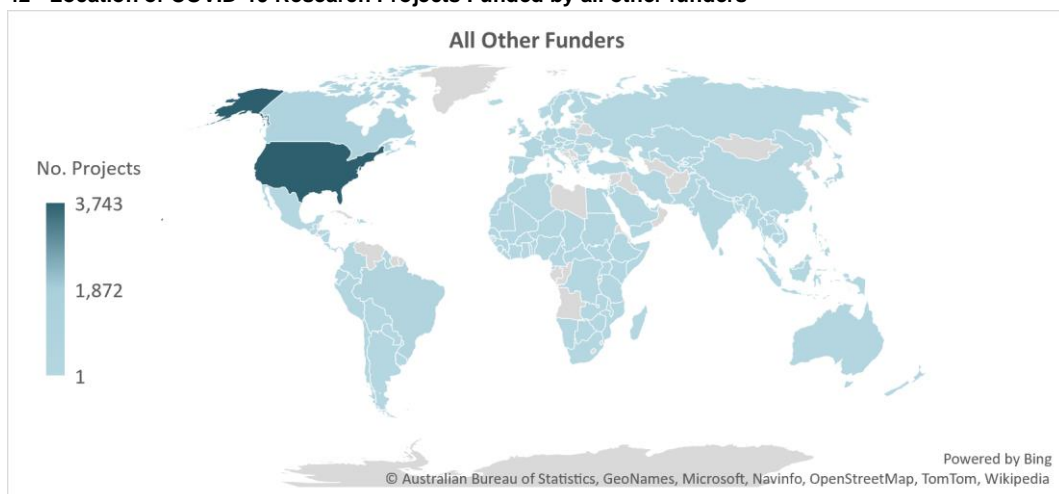
Note for Figure 40: Individual research projects may take place across multiple countries. Data on individual country names available for 95.6% of all projects funded by UKCDR members in the dataset.

Figure 41 - Location of COVID-19 Research Projects Funded by GloPID-R Members

GloPID-R Members

No. Projects

508

255

1

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Note for Figure 41: Individual research projects may take place across multiple countries. Data on individual country names available for 96.4% of all projects funded by UKCDR members in the dataset.

Figure 42 - Location of COVID-19 Research Projects Funded by all other funders

All Other Funders

No. Projects

3,743

1,872

1

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Note for Figure 42: Individual research projects may take place across multiple countries. Data on individual country names available for 98.7% of all projects not funded by either UKCDR or GloPID-R members in the dataset.

Table 19 – Location of COVID-19 research projects by region for UKCDR members, GloPID-R members, and all other funders (proportion of funder portfolio)

Region	UKCDR Members	GloPID-R Members/ Observers	All Other Funders
Central Africa	0.2%	1.5%	0.2%
Central Asia	0.0%	0.1%	0.0%
Eastern Africa	2.5%	4.7%	1.4%
Eastern Asia	0.4%	5.8%	2.3%
Eastern Europe	0.0%	0.8%	1.2%
Latin America and the Caribbean	0.7%	19.5%	10.6%
Melanesia	0.0%	0.0%	0.0%
North America	0.5%	22.2%	44.1%
Northern Africa	0.1%	0.6%	1.8%
Northern Europe	94.8%	18.4%	7.3%
Oceania	0.1%	3.9%	2.8%
Southeast Asia	0.4%	1.4%	5.6%
Southern Africa	0.7%	1.9%	0.7%
Southern Asia	0.9%	2.4%	3.3%
Southern Europe	0.2%	2.7%	2.1%
Western Africa	1.2%	3.8%	0.6%
Western Asia	0.2%	1.2%	1.6%
Western Europe	0.2%	23.8%	17.3%

Note for Table 19: *Individual research projects may take place across multiple regions. Location data was available for 97.8% of projects in the dataset (95.8% for UKCDR members, 96.5% for GloPID-R members, and 98.8% for all other funders). Geographic regions as defined by UN Statistics Division.*

INCOME GROUPS

Central to the aim of UKCDR's and GloPID-R's COVID CIRCLE initiative is to ensure alignment of research funders towards a coherent effort for supporting research globally, with a particular emphasis on strengthening efforts on COVID-19 research in lower- and middle-income countries (LMICs). To that end, Table 20 summarises the distribution of the projects in the three funder group data subsets across income groups as defined by the OECD Development Action Committee list of ODA recipients.

Table 20 - Location of COVID-19 research projects by income group for UKCDR members, GloPID-R members, and all other funders (proportion of funder portfolio)

Income Group	UKCDR Members	GloPID-R Members/ Observers	All Other Funders
High Income	91.3%	68.5%	80.5%
Middle Income	3.5%	27.3%	17.7%
Lower Middle Income	*2.1%*	*6.0%*	*6.5%*
Upper Middle Income	*1.8%*	*22.8%*	*11.5%*
Least Developed and Low Income	2.8%	6.7%	1.6%
LMIC	5.6%	31.4%	19.1%

Note for Table 20: *Individual research projects may take place across multiple countries and therefore income groups. Data on individual country names was available for 97.7% of projects in the database (95.6% for UKCDR members, 96.4% for GloPID-R members, and 98.7% for all other funders). Income group classifications as defined by OECD Development Action Committee List of ODA recipients.*

UKCDR Members Portfolio

When considering UKCDR members, it can be seen from Table 3 that 5.6% of this portfolio (with location information available) took place in at least one LMIC – lower than the corresponding percentage experienced by the all other funder portion of the database. There are several reasons behind this. Firstly, none of the UKCDR member organisations are based in an LMIC – with all funders being based in the UK. This is significant as, across all funders included in the database, an average of 81.7% of an individual funder's portfolio at least partially takes place in the same country where that funder is located (with 204 out of 272 funders possessing a portfolio whereby 100% of their projects at least partially take place in the same country that they are based, where data is available on individual countries).

Additionally, while UKCDR works to ensure coherence across UK government departments and research funders for international development, largely focusing on ODA-funded research, most individual members primarily fund research outside of their ODA budget, which may or may not at least partially take place in an LMIC. This is reflected in the research projects in the dataset. However, while a research project may be taking place outside an LMIC, the intended impact of that research may be at a global level, which would include LMICs.

Nevertheless, it should be mentioned that, of the most prominent high-income country-based funders of LMIC-focussed research (Table 2), four of the top ten are included among UKCDR members.

GloPID-R Members Portfolio

The greater geographic variety of the portfolio of GloPID-R members' projects comes into play again as projects are more evenly spread across income groups, as seen in Table 20. According to the available data, the table also demonstrates a significantly larger emphasis placed by GloPID-R members compared to the data subset of all other funders on research at least partially taking place in not only LMICs, but also in countries designated as being among the *least* developed and low-income countries (more than four times the amount). Moreover, even when *excluding* data from funders based in LMICs, the GloPID-R portion of the database would still demonstrate that 16.2% of projects with location data are at least partially taking place in LMICs (which contrasts to 4.5% for all other funders under the same conditions).

RESPONSE TO LMICS

UKCDR Member Portfolio

Looking in more detail at the research response of the various groups of funders to the challenges of COVID-19 in LMICs, Figure 43 presents the timeline of this funding activity. Interestingly, the top three months in terms of the greatest number of LMIC-focused projects for each of the three subsets of data all fall between this May to October 2020 period with one exception. For the UKCDR member portion of the database, October 2021 saw the highest *number* of projects (20.2% of all LMIC-focused projects) with the next highest months being October 2020 (12.5%) and May 2020 (11.5%). The highest growth in the *value* of these LMIC-focused projects was seen in October 2021 (at $18m, accounting for 25.9% of known funding), closely followed by September 2020 (at $17.3m and accounting for 24.8%) despite this month only seeing 14 projects awarded (based on available data).

Figure 43 - Cumulative Number of LMIC-Focussed Projects Funded by Month of Funder Database Release For UKCDR members, GloPID-R members, and all other funders
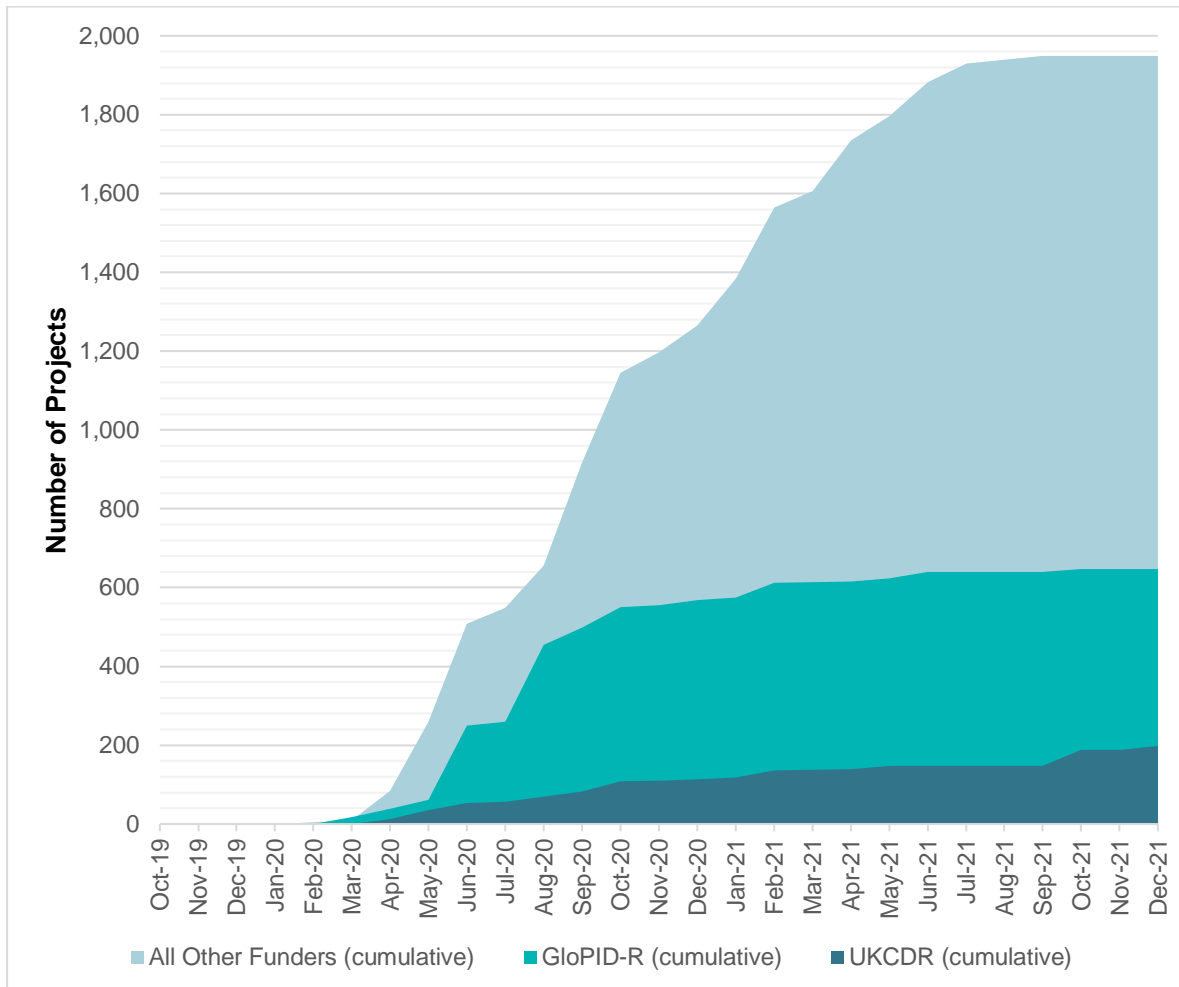
Note for Figure 43: Dates of database release were available for 87.3% of all projects in the dataset (available for 89.6% of UKCDR member projects, 84.8% of GloPID-R member projects, and 87.6% of projects from all other members). Individual research projects may take place across multiple countries and therefore income groups. Data on individual country names was available for 97.7% of projects in the database (95.6% for UKCDR members, 96.4% for GloPID-R members, and 98.7% for all other funders). 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).

Thinking about sustained research responses to LMICs, the data suggests that although the UKCDR member portion of the database contains proportionately fewer projects at least partially taking place in an LMIC (Table 19), significant funder activity was proportionately greatest within this subset of data. Defining 'significant LMIC-focused funder activity' as a month whereby the total number of LMIC-focused projects is greater than or equal to 5% of the total number of LMIC-focused projects (with available information on the dates of database release), UKCDR members collectively experienced nine such months (compared to eight months for all other funders). In terms of the latter subset of data, there was not a month of significant LMIC-focused activity beyond the spring of 2021, whereas two of the final three months of 2021 had significant LMIC-focused activity for the UKCDR member portion of the dataset.

GloPID-R Members Portfolio

From the timeline of the research response to the challenges of COVID-19 in LMICs (Figure 43), it can be seen for the GloPID-R member portion of the database that funding activity for LMIC-focused research was most concentrated early on in the pandemic between May and October 2020, with this period accounting for 79.1% of the total number of LMIC-focused projects (with available publication date information) – significantly higher than the figure for the portfolio of all other funders (54.4%).

Across the entire time period under consideration in this analysis, the month where the value of LMIC-focused projects was greatest for the GloPID-R portion of the database was in April 2020 ($349.9m), which was an entire year before the peak month of funding for the data subset of all other funders in April 2021 ($15.9m). This emphasises a comparatively rapid research response to LMICs from GloPID-R members. In terms of the funding amounts for these projects more generally, the three months where the known value of the LMIC-focused projects was greatest for the GloPID-R member portion of the database occurred within the first seven months of COVID-19 being declared a pandemic by the WHO in March 2020. For the data subset of all other funders, the three months with the greatest known funding amounts took place in the fifteen months between April 2020 and June 2021.

CO-FUNDING

Building on Annex B and Figure 14, which stated that 4.8% of all research projects in the entire database were funded as a result of co-funding (either from multiple organisations directly or from membership-based organisations), the extent of co-funding was greater for the database in its entirety than for either UKCDR members or all other funders subsets (3.9% and 3.8%, respectively). However, the proportion of co-funded research for the subset of GloPID-R member data was far greater at 16.1%. Figures 44 and 45 summarise the organisations co-funding the greatest number of projects for both the UKCDR and GloPID-R data subsets.

In terms of the LMIC-focused portion of these portfolios, LMIC-focused research co-funded by at least one GloPID-R member organisation constituted approximately one third (31.0%) of the overall number of projects co-funded by at least one GloPID-R member, according to the data – a similar level to all other funders (30.4%). Interestingly, this figure is much higher for the UKCDR member portion of the database, with 56.5% of co-funded projects taking place in at least one LMIC.
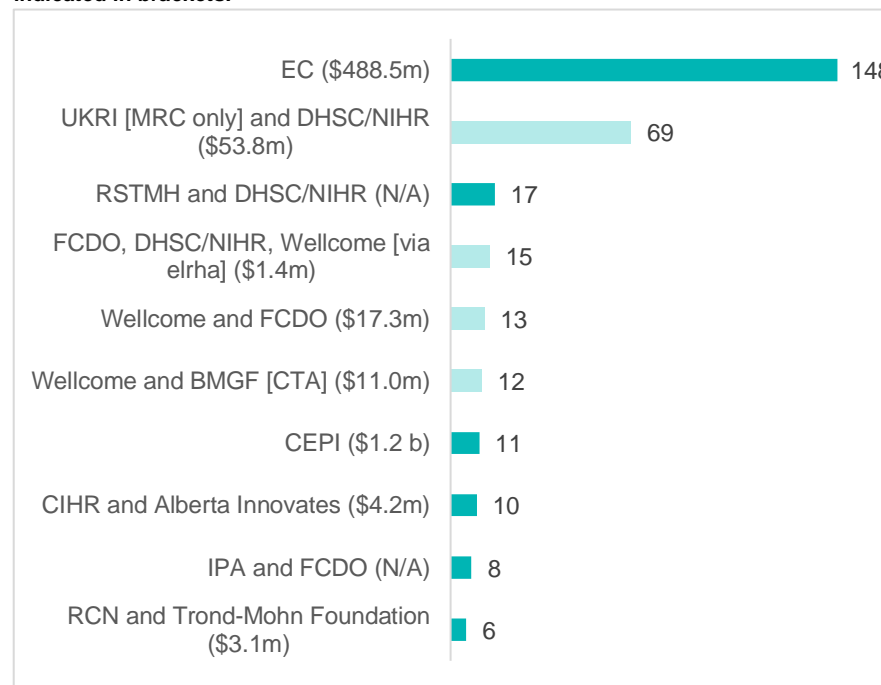
Figure 44 - Co-funding organisations involving UKCDR member organisations awarding the greatest number of COVID-19 research projects. Known value of portfolio indicated in brackets.

UKRI and DHSC/NIHR ($53.8m)	69
RSTMH and NIHR (N/A)	17
FCDO, DHSC/NIHR, Wellcome [via elrha] ($1.4m)	15
Wellcome and FCDO ($17.3m)	13
Wellcome and BMGF [CTA] ($11.0m)	12
IPA and FCDO (N/A)	8
FCDO and UNICEF (N/A)	1
ICMR and DHSC/NIHR ($83k)	1
ICMR, DHSC/NIHR, UKRI ($241k)	1
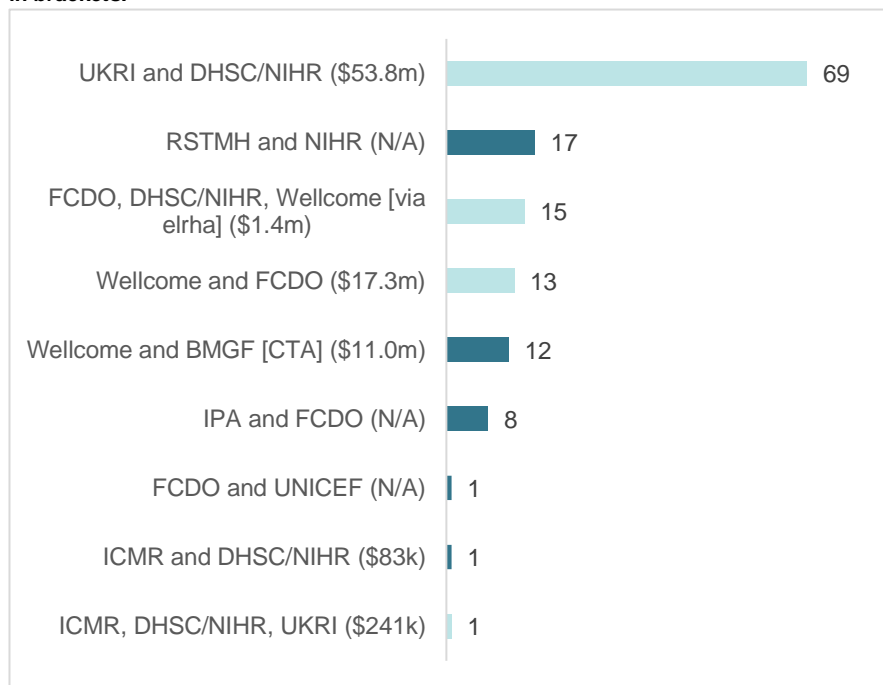
Co-funding between multiple UKCDR members

Note for Figure 44: Co-funding is defined as the awarding of projects by multiple organisations directly or from membership-based organisations. 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 (available for 85.0% of UKCDR member projects).

Figure 45 - Co-funding organisations involving GloPID-R member organisations awarding the greatest number of COVID-19 research projects. Known value of portfolio indicated in brackets.

EC ($488.5m)	148
UKRI [MRC only] and DHSC/NIHR ($53.8m)	69
RSTMH and DHSC/NIHR (N/A)	17
FCDO, DHSC/NIHR, Wellcome [via elrha] ($1.4m)	15
Wellcome and FCDO ($17.3m)	13
Wellcome and BMGF [CTA] ($11.0m)	12
CEPI ($1.2 b)	11
CIHR and Alberta Innovates ($4.2m)	10
IPA and FCDO (N/A)	8
RCN and Trond-Mohn Foundation ($3.1m)	6

Co-funding between multiple GloPID-R members

Note for Figure 45: Co-funding is defined as the awarding of projects by multiple organisations directly or from membership-based organisations. 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 (available for 67.6% of GloPID-R member projects).

COVID CIRCLE FUNDER CONSULTATION

INTRODUCTION

The COVID CIRCLE initiative, a joint initiative between UKCDR and GloPID-R aims to collate learnings from the funding and research response to the COVID-19 pandemic to inform the response to this and future epidemics and pandemics. The learning is framed around the Seven Principles for supporting high quality research for the most pressing needs in epidemics and pandemics and will have a global view with a low- and middle-income country focus.

AIM

To facilitate learning for both funders and researchers to improve future response to epidemics and pandemics.

OBJECTIVES

    a. Explore barriers and enablers to COVID-19 research funders fulfilling the Seven Principles for funding high quality research for the most pressing global needs in epidemics and pandemics.
    b. Identify potential enablers or windows of opportunity for the translation of the Seven Principles into practice within the ongoing research response for the COVID-19 pandemic in LMICs.

METHODS

COVID CIRCLE undertook a funder consultation between 1st February, 2021 and 21st April, 2021. This consultation involved a survey of research funders involved in the COVID-19 response, funder interviews and consultations with UKCDR funders groups.
The survey was developed and internally piloted, before opening between 1st February, 2021 and 15th March, 2021, using *SurveyMonkey.*

Both open and closed-ended questions were included in the survey's three sections which focused on: defining respondents, proposal of case studies and specific questions pertaining to the application of the seven funder principles respectively. Funders were offered the option of presenting a consolidated response from their organisations or individual contributions and could also contribute through an interview (survey questions provided in Annex A).

In addition, four UKCDR funders groups (Disasters Research Group, Capacity Strengthening Group, Epidemics Funders Group and Equitable Partnerships Taskforce) were consulted, between 21st February 2021 and 22nd April, 2021, to facilitate cross-sectoral learning, gain expert insights into specific funder principles and

increase the breadth of responses, as these groups have representation from multiple funding organisations including LMIC funders.

Proposed case studies were reviewed by a selection panel and shortlisted cases were developed through further in-depth funder interviews to identify key learnings and innovative funder practice in response to COVID-19. Cross cutting themes and recommendations from these interviews are also incorporated in the results section here.

All responses were anonymised and data was managed in accordance with Wellcome policies.

FINDINGS/ RESULTS

SURVEY AND FUNDER CONSULTATION

Survey responses were received from 10 funding organisations (global, LMIC-based and UK-based) and included private, public, non-governmental and philanthropic organisations. Four UKCDR funders groups were consulted: Disasters Research Group, Capacity Strengthening Group, Epidemics Funders Group and Equitable Partnerships Taskforce.

Each of the seven principles was ranked between 3 – 5 (out of 5) by the majority of funders in an assessment of the extent to which their application was prioritised in the development of research funding responses to COVID-19 in LMICs. This is an indication of the high level of importance funders attach to the application of the seven principles for an effective pandemic response.

ENABLERS TO APPLYING THE SEVEN FUNDER PRINCIPLES

Cross cutting enablers

Funders can play a vital role in setting the standards for the adherence to best practice in research during epidemics and pandemics. Several approaches were taken to embed the principles in pre and post award activities including:

a. Embedding the seven principles in the design of projects and programmes.
b. Specific requirements of grantees (which were considered by peer reviewers) in funding call specifications.
c. Requiring grantees to demonstrate application of the principles in submitted research proposals. Where there were doubts of successful projects meeting specific principles, written contingencies or changes of the project plan were requested prior to funding being approved.

Enablers of the application of specific principles:

1. **Alignment to global research agendas and locally identified priorities**
a. Funders highlighted the importance of the timely availability of the WHO Research Roadmap for setting their research agenda. Further, the availability of regional research goals e.g. Research for Development goals for Africa Report and LMIC research priorities identified by AAS/TGHN/UKCDR

collaborative study was appreciated by funders. COVID CIRCLE activities complemented these efforts by providing regular analyses of funded projects (mapped against research priorities) and enabled identification of potential gaps in research funding, which some funders considered in prioritising research activities.

b. Engagement and coordination with local/regional research and policy organisations particularly in Africa gave funders insights into the evolving local/regional research needs and promoted the support of projects with high potential for influencing policy and practice. Key partners mentioned by funders include Africa CDC, WHO Afro and the African Academy of Sciences.

2. **Research capacity for rapid research**
a. Rapid funding was most easily facilitated through supplementing existing funded research activities and harnessing existing research partnerships.
b. Amending research funding processes for new grantees - Several funders initiated "rapid funding mechanisms" to address the urgent need for research evidence during the pandemic. Funders highlighted introducing fast track processes or simplified grant application processes as key enablers for rapid funding and initiation of research, particularly where these mechanisms were in place prior to the pandemic.

3. **Appropriate ethical consideration**
   a. Rapid ethical approval was easier for projects with existing Institutional Review Board (IRB) /Ethics Review Board (ERB) certification
   b. Engaging local partners - Obtaining ethical approval was easier where in- country partners with an understanding of how to navigate local approval systems facilitated review processes

4. **Collaboration and learning enhanced through coordination**
   a. Monitoring and evaluation for learning for the future - Several funders plan to or have undertaken monitoring and evaluation activities to assess the alignment of their COVID-19 response to the seven principles to learn lessons for the future. Funders either incorporated these into their routine M&E activities (e.g. annual reviews) or created bespoke processes for learning from their COVID-19 responses.
   b. Data sharing and engagement of partners - *"I think Africa did well in terms of coordination between major decision-making institutions".*
   A high degree of coordination and interaction within regional research and policy organisations and strong networks in the African sub-region was identified by funders as important for collaboration and information sharing.
   c. COVID CIRCLE activities- Several funders used the COVID CIRCLE Tracker and analyses to inform their decision making.

BARRIERS TO APPLYING THE SEVEN FUNDER PRINCIPLES

Cross cutting Barriers
The following barriers cut across several of the seven principles and limited funders' application of the principles in their research responses.

a. Time – "*Anything new e.g. commissioning research and new calls/rapid funding mechanisms, takes additional time as it requires new staff resource and processes to be developed*". Time was a significant limiting factor to applying the principles given the urgent need for rapid initiation of research in response to the pandemic.
b. Cost - Funders identified additional cost of supporting researchers to align their activities to the seven principles and additional operational costs as significant barriers to aligning with the principles. In LMICs partnerships this was further exacerbated by the relative lack of funding available through local organizations.
c. Difficulty monitoring compliance of grantees with the principles post award- Some funders attributed this to the lack universal metrics to monitor progress on applying some of the principles such as equity in partnerships.
d. Limited application of the principles in proposal review processes. It is difficult to assess the degree to which the principles are understood and factored into review panel processes.

Barriers of application of specific principles are highlighted below:

1. **Alignment to global research agendas and locally identified priorities**:
    a. Delayed development of and in some case absence of local and regional priorities hindered funders alignment of research agenda to these.

2. **Research capacity for rapid research**
    a. Grant review process- Funders identified the following barriers to rapid grant review processes. These include:
        i. Shortage of appropriate reviewers – inadequate numbers or reviewers of high expertise leads to delays in reviewing grant proposals.
        ii. Delays in funding processes- "*I think a big barrier is us ourselves, the review process even though we wanted them to be rapid…There are a lot of in-built breaks in reviewing and contracting*".
    b. Financial administration made it challenging for funders to fund LMIC partners directly without going through northern universities/ partners.
    c. Delayed ethical approvals hindered rapid initiation of research.

3. **Equitable, inclusive, cross-sectoral and interdisciplinary partnerships**:
    a. Insufficient funding to adequately support and sustain partnerships.
    b. Rapid research could potentially compromise the ability to ensure the strength and equity of research partnerships.

4. **Open science and data sharing**:
    a. Lack of clear guidelines on the optimal data sharing requirements (for the different types of research).

5. **Appropriate ethical consideration**
    a. "How fit for purpose are the ethical review processes for rapid research?" Rapid research could potentially compromise ethical considerations

including limiting the time to fully engage communities in setting research agenda, defining methods, and sharing findings.

Recommendations for future practice

Cross cutting Recommendations

a. Embed the application of the seven principles in the entire funding process including in the processes, proposal scoring and awarding of grants.
b. Develop guidance for applying ("operationalising") the seven principles
c. Funder collaboration to facilitate:
    - agreement on guidance for applying the principles
    - development of agreed mechanisms for tracking progress on applying the principles. For instance, research capacity strengthening, equitable partnerships, data sharing etc
d. Preparedness:
    - Application of the principles should be included in funders' epidemic/ pandemic preparedness activities. Here, funders can invest in partnerships, engage with relevant regional/ local stakeholders, develop rapid funding mechanisms and pilot these prior to disease outbreaks.
    - Increase awareness of funder and researcher coordination initiatives such as GLoPID-R and UKCDR and plans made to resource when required.
    - Increase awareness of existing research mechanisms for funding research during acute crises. Many funders developed responsive mechanisms for research following the West Africa Ebola (2014-2016) outbreaks and these, together with mechanisms developed during this current pandemic, will be useful for preparedness for future pandemics.

Recommendations for the application of specific principles are highlighted below:

1. **Alignment to global research agendas and locally identified priorities**: Establish partnerships/groups of expert consultants in advance of future pandemics to facilitate rapid consultation for regional and local research priority setting.
2. *Research capacity for rapid research* – Funder coordination to prevent shortage of reviewers through joint funding calls with well-coordinated review processes where reviewer lists are shared "*We can do better at coordinating the databases, so you don't for instance send several applications to one reviewer*".
3. **Open science and data sharing**:
    a. Development of clear and consistent policy expectations and guidance for openness across funders
    b. Make clear what the optimal requirements and guidelines are for sharing data for different kinds of research i.e. for biomedical research (which perhaps can be fully anonymised) versus social sciences research where information/ interviews on cultures and detailed accounts are used.
    c. Develop community infrastructure and practices for data sharing.
    d. To address ethical, legal and political constraints to data sharing. This will ensure trustworthy and equitable approaches which have the buy-in and support of LMICs.

e. Establish appropriate incentives for researchers that recognise and reward the rapid sharing of high-quality data and findings.

SUMMARY TABLE OF FINDINGS

Table 21 - Crosscutting enablers and barriers to and recommendations for applying the seven funder principles

ENABLERS
• Embedding principles in the design of projects and programmes
• Including grantee requirements in funding call specifications
• Grantees demonstrating application of the principles in submitted proposals
BARRIERS
• Time
• Cost
• Difficulty monitoring compliance with principles post award
• Limited application of the principles in the proposal review process
RECOMMENDATIONS
• Embed application of the principles in the entire funding process
• Develop guidance for "operationalising" the principles
• Funder collaboration to agree on guidance for applying the principles
• Funder collaboration to agree on mechanisms to track progress on the principles
• Application of principles in funders' pandemic preparedness activities
• Increase awareness of existing funder and researcher coordination initiatives
• Increase awareness of existing responsive funding mechanisms which are important for pandemic preparedness

Table 22 - Enablers to applying the seven funder principles

PRINCIPLES	ENABLER(S)
Alignment to global research agendas and locally identified priorities	▪ Timely availability of the WHO Research Roadmap for setting research agenda ▪ Engagement with local/regional research and policy organisations to gain insights into evolving priorities
Research capacity for rapid research	▪ Supplementing existing funded research activities and funding research through existing partnerships ▪ Expediting research funding processes through rapid funding mechanisms
Appropriate ethical consideration	▪ Projects with existing IRB/ERB certification ▪ Engaging local partners knowledgeable in navigating local ethics review processes
Collaboration and learning enhanced through coordination	▪ Monitoring and evaluation for learning for future response ▪ Data sharing and engagement of partners ▪ COVID CIRCLE tracker and analysis for informing decision making

Table 23 - Barriers to applying the seven funder principles

PRINCIPLES	BARRIER(S)
Alignment to global research agendas and locally identified priorities	▪ Delayed development or absence of regional or local priorities
Research capacity for rapid research	▪ Shortage of appropriate reviewers ▪ In-built delays in funding processes ▪ Financial administration especially in funding LMIC processes ▪ Delayed ethical approvals
Equitable, inclusive, cross-sectoral and interdisciplinary partnerships	▪ Insufficient funding to adequately support and sustain partnerships ▪ Rapid research could potentially compromise the ability to ensure the strength and equity of research partnerships
Open science and data sharing	▪ Lack of clear guidelines on the optimal data sharing requirements (for the different types of research).
Appropriate ethical consideration	▪ Rapid research could potentially compromise ethical considerations in research

Table 24 - Recommendations for applying the seven funder principles

PRINCIPLES	RECOMMENDATION(S)
Alignment to global research agendas and locally identified priorities	▪ Establish partnerships/groups of expert consultants in advance of future pandemics to facilitate rapid consultation for regional and local research priority setting.
Research capacity for rapid research	▪ Funder coordination to prevent shortage of reviewers through joint funding calls with well-coordinated review processes where reviewer lists are shared.
Open science and data sharing	▪ Development of clear and consistent policy and guidance expectations for openness across funders ▪ Make clear what the optimal requirements and guidelines are for sharing data for different kinds of research i.e. for biomedical research versus social sciences research. ▪ Develop community infrastructure and practices for data sharing. ▪ To address ethical, legal and political constraints to data sharing in LMICs.

SURVEY QUESTIONS

COVID CIRCLE FUNDER CONSULTATION

Page 1: Introduction
This survey forms part of the COVID CIRCLE funder consultation for the learning element of our work. If you would prefer to contribute to this consultation though an interview (especially the proposals for case studies), please contact Rachel Miles at R.Miles@ukcdr.org.uk to arrange a time.

The consultation aims to:

1. Explore barriers and enablers to COVID-19 research funders fulfilling the Seven Principles for funding high quality research for the most pressing global needs in epidemics and pandemics. (link to PDF)

2. Identify potential enablers or windows of opportunity for the translation of the Seven Principles into practice within the ongoing research response for the COVID-19 pandemic in LMICs.

3. Identify any new lessons learnt from the first year's research response to COVID-19 to inform funder practice for future epidemics or pandemics in LMICs.

The survey takes approximately **20 – 30 minutes** to complete. You may wish to seek input from colleagues within your organisation to provide a consolidated response. To facilitate this, a text version of the survey questions is available **here.**

COVID CIRCLE Initiative Learning Project
The COVID CIRCLE Initiative is a learning and coordination partnership between UKCDR and GloPID-R aimed at supporting funders and researchers to deliver a more effective and coherent global research response during the COVID-19 pandemic.

This survey is part of the COVID CIRCLE initiative to facilitate learning for funders and researchers to improve research responses to pandemics and epidemics in LMICs.

Page 2: Consent form
The information/data you provide may be used in a publication on learning from the COVID-19 research response and will feed into discussions at various UKCDR Funders Groups, GloPID-R Working Groups and the COVID CIRCLE Steering Group. Any quotes used will be anonymised and refer only to your high-level type of organisation (for example, a public research funder). The original data forms collected will not be shared with any other third parties. In line with Wellcome policies, under which UKCDR operates, data generated in the course of the project will be kept securely in electronic form for a period of nine months in accordance with Wellcome policy.

- I agree to complete the questionnaire

- I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason
- I agree to the use of anonymised quotes in the COVID CIRCLE Learning publication.
- I agree to the use of anonymised quotes in other COVID CIRCLE public communications e.g., blogs, annual report
- I agree to be contacted by COVID CIRCLE for further information

---------------------------------*Section A: Defining respondents*------------------------------

Q1)
a. What funding organisation are you responding on behalf of?
b. Name & position of respondent in organisation
c. Email address
d. Name & country of organisation
e. Type of organisation (public, private, non- governmental, Other)
f. What proportion of your COVID-19 research funding has been focussed on research undertaken in LMICs? (please include amounts and period of investment and whether the funding is ODA)
g. How are you planning to learn from or evaluate your own COVID-19 research investments?

---------------------------------*Section B: Proposals for case-studies*-----------------------

As part of the COVID CIRCLE learning element, we will be developing case studies with research projects or programmes which have demonstrated innovative best practice in research in epidemics. These case-studies will identify the factors of success that might inform future funding and research practice in epidemics and will be selected by the COVID CIRCLE Steering Group from any recommendations provided.

Q2) Please propose any of your funded projects or programmes as examples that demonstrate innovative practice for research in epidemics for LMICs against any of these seven principles? (up to 5 projects or programmes)

    a. Project name & funder reference
    b. Additional details
    c. Principal Investigator name
    d. Please confirm whether you can facilitate an introduction if selected as a case study (Y/N)
    e. Please summarise why this would make a good case study?
    f. Which of the Seven COVID CIRCLE Funders Principles does it address?

Alignment to global research agendas and locally identified priorities	
Research capacity for rapid research	
Equitable, inclusive, cross-sectoral and interdisciplinary partnerships	
Open science and data sharing	
Protection from harm	
Appropriate ethical consideration	
Collaboration and learning enhanced through coordination	

--------------Section C: Enablers, barriers and recommendations for applying the Seven Funders Principles for Supporting High-Quality Research for the Most Pressing Needs in Epidemics and Pandemics--

Principle 1. Alignment to global research agendas and locally identified priorities.
To consider global research priorities, such as proposed by the World Health Organisation (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.
Q3) To what extent has "*Alignment to global research agendas and locally identified priorities"* been a priority in developing your research funding response to the COVID-19 pandemic in LMICs?

1	2	3	4	5

<rank score: 1 = not at all, 5 = to a great extent>
    a. Which research priorities have you aligned your funding to?
        i. WHO Research Roadmap for COVID-19
        ii. African Academy of Sciences priorities
        iii. LMIC priorities
        iv. UN Recovery Roadmap
        v. Other [please specify]
    b. What are the additional specific enablers to applying this principle (including any changes you made to funding practice in response to this pandemic)? <open ended>
    c. What are the specific barriers to applying this principle and how can these be overcome? <open ended>

Principle 2. Research Capacity for Rapid Research
a. To build upon existing research capacity and systems, where available.
b. To support capacity strengthening necessary for the research.
Q4) To what extent has "*Research capacity for rapid research"* been a priority in developing your research funding response to the COVID-19 pandemic in LMICs?
<rank score: 1 = not at all, 5 = to a great extent>

1	2	3	4	5

a. Have you leveraged prior funded research programmes to respond to COVID-19? (Y/N)
      If yes, what type of programmes were these?
          i. Clinical research networks
          ii. Cohorts
          iii. Other- please specify
b. Have you used any flexible or rapid funding mechanisms to support research on COVID-19? (Y/N)
      If yes, how did you achieve this?
          i. Supplementing existing grantees
          ii. Approving pivoting of already funded research projects
          iii. Commissioning research
          iv. Closed research calls to existing grantees

      v.   Rapid open funding   vi.   Others
           call mechanisms

Please comment on the success of these mechanisms in expediting
i. decision making <open ended>
ii. research being undertaken <open ended>
iii. Funding flowing to grantees <open ended>

c. Have you explicitly supported capacity strengthening as part of the research response? (Y/N)
    If yes, please provide details <open ended>
d. What are the additional specific enablers to applying this principle (include any changes made to funding practice in response to this pandemic)? <open ended>
e. What are the specific barriers to applying this principle and how can these be overcome? <open ended>

Principle 3**. **Equitable, inclusive, cross-sectoral and interdisciplinary partnerships
a. To support equitable partnership throughout the research process.
b. To promote inclusive and cross-sectoral partnerships to ensure that research is most likely to impact policy and practice.
c. To promote interdisciplinary research
Q5) To what extent have "***Equitable, inclusive, cross-sectoral and interdisciplinary partnerships"*** been a priority in developing your research funding response to the COVID-19 pandemic in LMICs?
<rank score: 1 = not at all, 5 = to a great extent>

1	2	3	4	5

a. Have you given or referred to any specific guidance for your researchers on partnerships? (Y/N)
    If yes, which of these partnership aspects did it address (You can link to the guidance)?
    - i.   KFPE
    - ii. COHRED Research Fairness Initiative
    - iii. TRUST Global Code of Conduct
    - iv. UKCDR building a partnership of equals
    - v.   Other [Pease specify]
b. Has the research approach to COVID-19 catalysed your organisation forming new, equitable partnerships or hindered it? <open ended>
c. What are the additional specific enablers to applying this principle? <open ended>
d. What are the specific barriers to applying this principle and how can these be overcome? <open ended>

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.
Q6) To what extent has "***Open Science and Data Sharing***" been a priority in developing your research funding response to the COVID-19 pandemic in LMICs?
<rank score: 1 = not at all, 5 = to a great extent>

1	2	3	4	5

    a. Have you given or referred to any specific guidance for your researchers on **open science** (e.g., that outputs arising from grants should be publicly available or shareable)? (Y/N)
      If yes, what is the requirement (you can link to the guidance) and was this updated in response to the COVID-19 funding? <open ended>
    b. Have you given or referred to any specific guidance for your researchers on **data sharing**? (Y/N)
      If yes, what is the requirement (you can link to the guidance)? <open ended>
    c. Please list any specific repositories mentioned in your guidance. <open ended>
    d. What are the additional specific enablers to applying this principle? <open ended>
    e. What are the specific barriers to applying this principle and how can these be overcome? <open ended>

Principle 5. Protection from harm.
To take all reasonable steps to anticipate, mitigate and address harm to those involved with research funded.
Q7) To what extent has "***Protection from harm***" been a priority in developing your research funding response to the COVID-19 pandemic in LMICs?
<rank score: 1 = not at all, 5 = to a great extent>

1	2	3	4	5

    a. Have you given or referred to any specific guidance for your researchers on protection from harm? (Y/N)
      If yes, what is the guidance?

       i. UKCDR Guidance on Safeguarding in International Development Research COVID addendum

       ii. UK Research and Innovation (UKRI) Preventing harm in research

       iii. National Institute of Health Research (NIHR) Safeguarding Guidance

       iv. DFID Enhanced Due Diligence: Safeguarding for external partners

       v. Other [Please specify]

    b. What are the specific enablers to applying this principle? <open ended>
    c. What are the specific barriers to applying this principle and how can these be overcome? <open ended>

[Principle 6](#). Appropriate ethical consideration.
To ensure appropriate ethical consideration is embedded throughout research conducted, in particular regarding access to the products of research.
Q8) To what extent has "***Appropriate ethical consideration***" been a priority in developing your research funding response to the COVID-19 pandemic in LMICs?
<rank score: 1 = not at all, 5 = to a great extent>

1	2	3	4	5

    a. Have you given or referred to any specific guidance for your researchers on ethical consideration? (Y/N)
       if yes, what is the guidance?

        i. [Declaration of Helsinki – ethical principles for medical research involving human subjects](#)

        ii. [Nuffield Council on Bioethics – Research in Global Health Emergencies: Ethical Issues](#)

        iii. [CIOMS and WHO International Ethical Guidelines for Health Related Research involving humans](#)

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

        v. [TRUST Global Ethics Code of Conduct for research in resource poor settings](#)

        vi. [San Code of Research Ethics](#)

        vii. Other [Please specify]

b. What are the specific enablers to applying this principle? <open ended>
c. What are the specific barriers to applying this principle and how can these be overcome? <open ended>

Principle 7. Collaboration and learning through enhanced 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.
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.
c. To 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.

Q9) To what extent has "***Collaboration and learning through enhanced coordination***" been a priority in developing your research funding response to the COVID-19 pandemic in LMICs?
<rank score: 1 = not at all, 5 = to a great extent>

1	2	3	4	5

a. Have you co-funded or collaborated with any other funding organisations for COVID-19 research funding? (Y/N)
b. If yes, please provide details.
    i. Have any funders collaboration groups facilitated your funding response?UKCDR
    ii. GloPID-R
    iii. COVID CIRCLE activities
    iv. Other
c. Have you used the UKCDR & GloPID-R COVID-19 funding tracker to inform your activities? (Y/N)
    If yes, how?
    i. For informing funding decisions
    ii. For briefing strategy panels
    iii. For identifying opportunities for collaboration
    iv. Other [please specify]

d. Have you used the COVID CIRCLE Living Mapping Review? (Y/N)
    If yes, how? <open ended>
e. What are the additional specific enablers to applying this principle (including any changes you made to funding practice in response to this pandemic)? <open ended>
f. What are the specific barriers to applying this principle and how can these be overcome? <open ended>

Q10) Is there anything further that you would like to share regarding the research funding response to COVID-19 in LMICs (after considering the entire survey)?
a) If yes, please provide details <open ended>

RESEARCHER SURVEY FINDINGS

Introduction

The COVID CIRCLE initiative, a joint initiative between UKCDR and GloPID-R aims to collate learnings from the funding and research response to the COVID-19 pandemic in and for low resource settings, to inform future epidemics and pandemics. To capture this learning, surveys were undertaken with funders and researchers of COVID-19 research in low- and middle-income countries (LMICs). This researcher survey analysis complements a separate analysis of a funder consultation survey undertaken as part of the COVID CIRCLE initiative.

Aim

To capture researchers' perspectives on barriers and enablers to an effective funding and research response to the COVID-19 pandemic.

Objectives

- Highlight specific barriers and enablers to an effective funding and research response to COVID-19 in alignment with the 7 funder principles for supporting high quality research for the most pressing global needs in epidemics and pandemics.
- Identify recommendations on how funders could support researchers to fulfil the relevant 7 funder principles, and highlight broader research system needs to ensure an effective research response to future epidemics and pandemics.

Methods

The COVID CIRCLE researcher survey was developed and distributed using the Survey Monkey tool, and open between 3rd March 2021 and 23rd April 2021. The survey was shared through an event invitation for the COVID-19 Research in LMICs meeting, which brought together researchers and funders #from across the world working on COVID-19 research focussed on LMICs, and attended by over 500 researchers. The survey was re-shared during the meeting, to capture perspectives from the researchers present at the meeting, and interim findings were shared during the meeting to facilitate discussion. To ensure inclusion of non-English speakers, the survey was also translated into French, Spanish and Portuguese and responses translated using DeepL. Informed consent was sought from all survey respondents. The questions were a mix of ranked quantitative and open text response qualitative options, and qualitative analysis was undertaken using inductive qualitative research methodology to explore and identify key themes emerging from the data.

Results

The survey was completed by 70 researchers from across the world, with the majority of respondents from East Africa, Western Europe, South Africa and South-East Asia followed closely by South Asia and West Africa. Other respondents were based in Central Africa, Central America, South America, South-East Asia and Northern Europe.

Barriers to effective and high-quality research during epidemics and pandemics

The survey explored researchers' perspectives on barriers to effective research for epidemics and pandemics, framed around the 7 funder principles. Respondents were asked

to identify the greatest barriers to research, and asked to select up to 3 top key barriers to undertaking research aligned to the 7 funder principles.

Top 3 barriers identified by researchers were (represented as percentage of researchers who ranked principle as top 3 barrier to effective COVID-19 research):

- Sufficient funding and capacity to undertake rapid research (76% of researchers ranked this one as of the top 3 barriers to effective COVID-19 research)
- Collaboration and coordination with other researchers working on COVID-19 research (56% of researchers ranked is this one as of the top 3 barriers to effective COVID-19 research)
- Forming and sustaining equitable, inclusive, cross-sectoral and interdisciplinary partnerships (44% of researchers ranked is this one as of the top 3 barriers to effective COVID-19 research)

Figure 46 - Barriers to effective COVID-19 research focussed on low- and middle-income countries
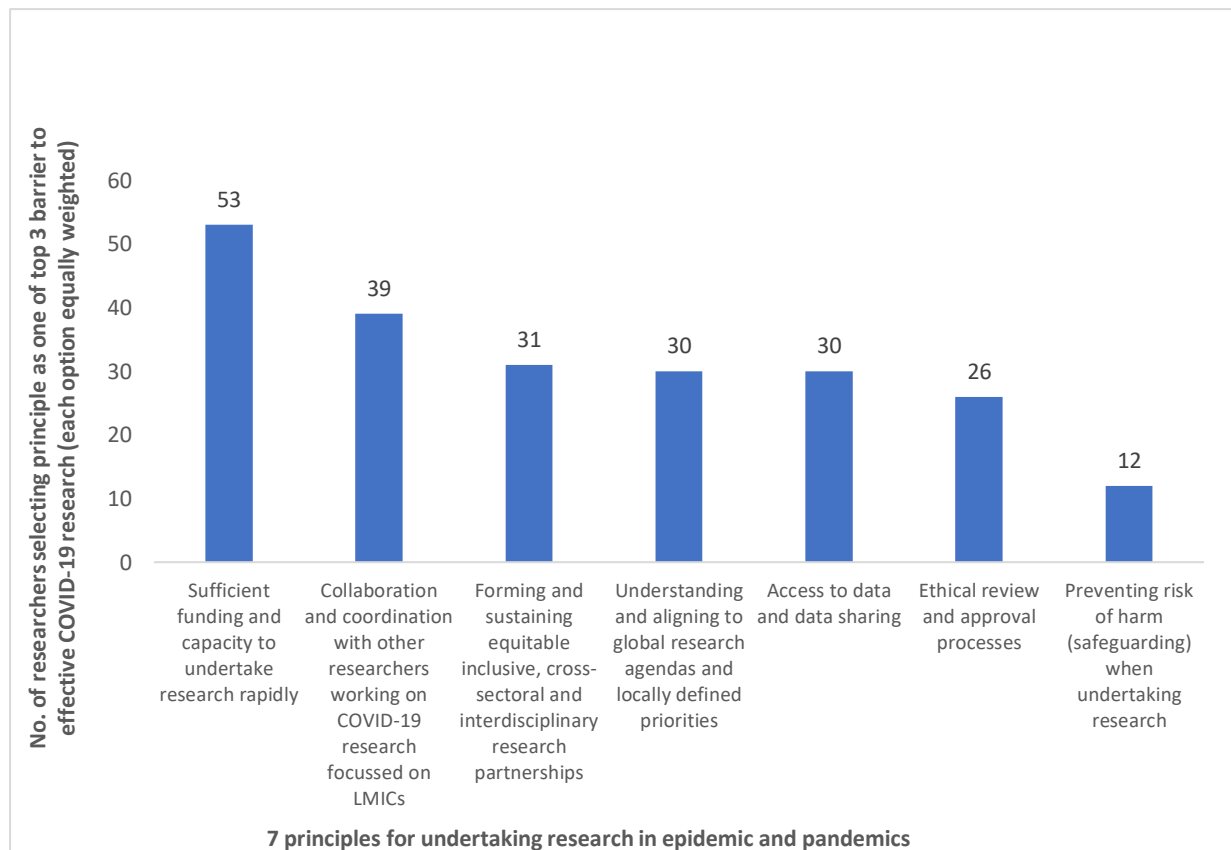
Whilst majority of the data on barriers was collected through multiple choice options, respondents were asked to provide any additional comments at the end of the survey. This additional feedback provided further detail about some of the barriers selected aligned to the 7 funder principles which are detailed below.

Principle	Barriers
Alignment to global research agendas and locally identified priorities	Whilst this was highlighted as a key barrier to undertaking effective COVID-19 research, respondents did not provide much further detail about this barrier. Some barriers highlighted by individual respondents were: • Sometimes difficult to identify locally defined research priorities. • Lack of collaboration and negative competition between national entities/countries
Research capacity for rapid research	• Demand for researchers with specific expertise (e.g epidemiology, disease modelling and health economics) in LMICs outstripped supply. • Regular funding calls and grant application processes took a long time and huge competition for relatively small amounts of funding. • Limited funding for policy-oriented research. • Challenges in obtaining funding, with some researchers or institutions highlighting need to rely on local funding, which was sometimes insufficient to address local priorities or build capacity, and put a strain on the institution and impeded delivery of existing projects. • Limited funding for early career researchers to participate in COVID-19 research. • Some funding focussed more on high income country priorities rather than LMIC priorities.
Equitable, inclusive, cross-sectoral and interdisciplinary partnerships	Barriers highlighted by some respondents were: • Limited funding to support partnerships. • Difficulty connecting with some partners. • Limited pool of researchers in LMICs with expertise relevant to epidemics and pandemics (e.g. mathematical modelling and epidemiology, health economics) research for partnership with Northern partners. One respondent indicated there was some competition between global North researchers for the same research teams in the Global South.
Open science and data sharing	Access to data and data sharing was highlighted as a key barrier. Specific issues identified included: • Issues with data quality for research (for example poor quality data in health information systems to monitor or detect an emerging epidemic). • Hesitance in sharing clinical data – sometimes difficult to obtain from public hospitals or institutions. Local collaborators also hesitant to share data due to concerns it reflects poorly on clinical practice. • Some institutions hesitant to share data to enable them to apply for their own research grants or use for publications. • Single centre data bias • Competition and conflict of interest hindering data sharing – particularly data used for vaccine development.

	• Limited funding available to access available data or hire data analysts. • Data secrecy • Poor infrastructure and limited internet connectivity.
Protection from harm (safeguarding)	• There was limited feedback about barriers to safeguarding. However, one researcher highlighted cross-infection and adverse outcomes thought to be due to PPE shortage.
Appropriate ethical consideration	• Slow ethics review was highlighted as a key barrier to research, and respondents highlighted number of different reasons including bureaucracy, need for ethical approval from multiple countries, slow national ethics committee review, delayed national ethics review processes, institutional review board delays and dependency on busy clinicians. • One researcher highlighted lack of transparency of ethics review board.
Collaboration and learning enhanced through coordination	There was limited expansion of barriers relating to collaboration and coordination. Some barriers highlighted were: • Lack of funding for sustaining collaboration • Lack of networks in key regions similar to Africa CDC or ALERRT networks in other regions such as South East Asia • Lack of fora for enhancing and sustaining collaboration • Difficulties establishing contact with other researchers. • Funding of small underpowered studies whose data could not be pooled was highlighted as a barrier as it limits coordination and potential research impact.
Cross-cutting barriers	**A number of cross-cutting barriers were highlighted which included:** • Bureaucracy, administrative delays and slow processes were key barriers to undertaking research rapidly (e.g. ethics approval). • Governance and political issues

Enablers of effective and high-quality research during epidemics and pandemics

This survey also identified factors which enabled researchers to effectively undertake COVID-19 research focussed on low- and middle-income countries, framed around how they enabled researchers to fulfil the 7 funder principles. The identified enablers associated with the individual principles, and cross-cutting enablers are highlighted below:

Principle	Enablers
Alignment to global research agendas and locally identified priorities	• International webinars, conferences and online literature and resources. For example, whilst the first WHO COVID-19 Global Research and Innovation Forum to identify global COVID-19 research priorities was initially hosted in person, subsequent meetings including WHO COVID-19 research working groups, have been held virtually and greater numbers of researchers have been able to participate, in particular those from low- and middle-income country researchers. • Availability of global research agendas was identified as a key enabler to understanding and aligning to global research agendas. • Existing relationships, networks and partnerships between and with local researchers, key stakeholders, organisations supported alignment with aligning to locally defined research priorities. However, one researcher highlighted the challenge of identifying locally defined research priorities.
Research capacity for rapid research	Enablers to supporting research capacity for rapid research were: • Launch of rapid research calls during the COVID-19 outbreak such as the Wellcome/FCDO Joint Initiative on Research in Epidemics Preparedness and Response, UKRI GCRF-Newton rapid response calls and the Institute Pasteur Network. • Availability of previous or existing local or institutional sources of research funding facilitated research to be undertaken rapidly. • Other enablers mentioned included small grants from some funders to undertake fieldwork and collaboration with projects e.g [REMAP-CAP](#), [ISARIC](#), CCP.
Equitable, inclusive, cross-sectoral and interdisciplinary partnerships	Enablers to building and sustaining partnerships were: • Pre-existing and previous partnerships (e.g ISARIC, MORU's Critical Care Asia Network), and the trust built through these partnerships was identified as a key enabler to equitable research partnerships. • Networking, webinars and opportunities for researchers to communicate and engage. • Agreeing principles on equity with partners, and also changing the perspective to equity rather than Northern partners such as the UK being there "to help".
Open science and data sharing	A number of enablers to open science and data sharing were identified including:

	• Availability of public data and existing public databases (e.g. NCBI databases) and access to national and government data (E.g. ministry of health database). • Internet access – particularly in LMICs. • Partnerships and collaborations with other researchers, both local and international which facilitated data collection, data sharing, and data sharing agreements, shared cross-country protocols and databases.
Protection from harm (safeguarding)	Researchers highlighted enablers for safety/prevention of risk and harm such as: • The use and availability of PPE, and the availability of standard operating procedures and protocols (such as safety protocols). • The use or provision of research ethics guidance to prevent risk of harm, such as the Canadian Tri-Council Policy statement, as well as ethics review by national ethics committee and institutional review boards (IRBs). • The ability to work remotely online and minimise face-to-face contact and PCR testing prior to undertaking field work. • The availability of safeguarding policies, risk assessment, COVID specific research guidelines, training in infection control and relevant safety information provided to participants.
Appropriate ethical consideration	Whilst ethics review was highlighted as a key barrier, some enablers of appropriate ethics review were: • Rapid/expedited ethics review processes were identified as a key enabler to effective research in epidemics and pandemics - particularly through specific activities such as the establishment of COVID specific ethics review committees or boards, online/remote ethics review and prioritised ethics review for COVID-19 research projects. • Standardisation of processes, the value of well-established ethics review mechanisms and working with local partners to quickly address IRB concerns.
Collaboration and learning enhanced through coordination	During an epidemic or pandemic, collaboration and coordination between researchers to identify potential research gaps, understand ongoing research activities and explore potential synergies or collaborations is particularly important. The following enablers to this identified by researchers were: • The value of existing partnerships and research networks (such as ISARIC, CCA, ALERRT) for supporting collaboration and coordination. • Webinars, virtual communication and online platforms (such as the Health Systems Global platform) to facilitate greater engagement and collaboration between researchers. • Willingness amongst researchers to share, engage and connect. The COVID-19 Research in LMICs

	meeting was highlighted as a space which could open up collaborative opportunities.
	• One respondent from the South East Asia region highlighted that it might be valuable to explore network/models such as the African Coalition for Epidemic Research, Response and Training (ALERRT) and replicate in other regions to facilitate greater research coordination and collaboration.
Cross-cutting enablers	• Established networks and partnerships seem to impact/enable a range of principles to ensure high quality and effective research, and therefore it may be important for funders and researchers to invest in building and sustaining networks and partnerships in between disease outbreaks to support preparedness and rapid research response in the event of another infectious disease outbreak.

KEY RECOMMENDATIONS

Researchers were also asked to identify recommendations to support fulfilment of the 7 funder principles for high-quality for the most pressing global needs in epidemics or pandemics.

Key recommendations were:

1. Ensure funding for building research capacity (including surveillance) in between epidemics and pandemics and balance this with funding emergency research during the an infectious disease outbreak.
2. Provide funding for establishment of partnerships, collaborations, networks or coordination mechanisms to support future rapid research response. There was a specific recommendation that the ASEAN region should use the Africa CDC model or the ALERRT network to coordinate response to COVID-19 (or future epidemics or pandemics) in South East Asia. Also a need for more global approaches from governments and funders to research and pandemic response.
3. Introduce small grants for epidemics/pandemic research for early career researchers.
4. Provide dedicated or direct funding to low- and middle-income countries– EDCTP rapid response funding in Africa was found to be critical, and more similar dedicated funding would be beneficial.
5. Provide funding for diverse types of research such as health systems research funding, rather than just disease specific applied research. Also provide funding for broader applied research, implementation science and cohort studies.
6. Provide funding to support with data sharing during epidemics or pandemics, including set up of data sharing platforms.
7. Remove of operational bottlenecks to expedite ethics review process.

Other relevant recommendations highlighted by individual researchers to be considered by funders to support future research response included:

• Earlier and easy access to broaden access to funding and grants.
• A "Global Fund" for preventing and dealing with emerging infectious disease.

- Follow on funding for dissemination of research results with policy makers to facilitate research uptake.
- Value and include LMIC regional leadership in agenda setting and research priorities for funding.
- One health approach to epidemics and pandemic research.
- Quicker turnaround on grant decisions, and easy to fill and focussed request for proposals.
- Review impact and quality of rapidly funded research projects to inform future research response.
- Long interdisciplinary programme-based funding involving industry partners.
- Less numerous dispersed calls and high funding amount per project available – this could address limitation of funding various, small underpowered studies of which data can't be pooled limits coordination and impact of research.
- Support human resource exchanges and clinical samples access through international agreements to simplify procedures.
- Greater flexibility at the time of grant application and more rapid grant applications.
- Creation of an international registry of researchers with COVID-19 or broader epidemics expertise and who could be immediately informed when relevant research funding is available.
- Fair renumeration for data collectors.
- Pre-approved protocols for research during epidemics – approved by all relevant stakeholders.
- Provide resources to strengthen and ensure long-term sustainability of health information systems for pandemic preparedness.