SYSTEMATIC REVIEW

A living mapping review for COVID-19 funded research projects: 21 month update [version 8; peer review: 2 approved]

Previously titled: A living mapping review for COVID-19 funded research projects: 18 month update

Adrian Bucher¹, Emilia Antonio², Henrike Grund¹, Nusrat Jabin¹, Chantel Jones¹, Meron Kifle¹, Susan Khader², Genevieve Boily-Larouche³, Morgan Lay⁴, Alice Norton²

¹UK Collaborative on Development Research, London, UK
²GloPID-R, Pandemic Sciences Institute, University of Oxford, Oxford, UK
³Institute of Infection and Immunity, Canadian Institutes of Health Research, Hamilton, Canada
⁴Institute of Population and Public Health, Canadian Institutes of Health Research, Toronto, Canada

Abstract

Background: The coronavirus disease 2019 (COVID-19) has resulted in an unprecedented research response, demonstrating exceptional examples of rapid research and collaboration. There has however been an ongoing need for greater coordination, with limited resources for research and the shifting global pandemic.

Methods: The UK Collaborative on Development Research (UKCDR) and Global Research Collaboration for Infectious Disease Preparedness (GloPID-R), two funder coordination groups have collaborated to develop a live database of funded research projects across the world relating to COVID-19. Drawing data continually from their members and further global funding bodies, as of 15th April 2022 the database contains 16,353 projects, funded by 319 funders,
taking place across 157 countries representing an investment of at least $6.2 billion. To our knowledge it is one of the most comprehensive databases. The database is aligned to the World Health Organisation and GloPID-R Global Research Roadmap: 2019 Novel Coronavirus and the UN Research Roadmap for the COVID-19 Recovery. It is being used by the WHO, governments and further policy makers, research funders and researchers. This living mapping review aims to supplement the database by providing an open accessible and frequently updated resource summarising the characteristics of the COVID-19 funded research portfolio. Both descriptive and thematic analysis are presented and updated frequently to aid interpretation of the global COVID-19 funded research portfolio.

**Results:** In this version eight analysis we provide an updated detailed descriptive analysis of the database (on data from three months after version seven) and focus our thematic analysis on research gaps, research areas in need of coordination, study populations and research locations (with a focus on resource-limited countries).

**Conclusions:** As the global funding response to COVID-19 plateaus, this living mapping review helps both funders and researchers to prioritise resources to areas where there is continued unmet research need.

**Keywords**
- Living systematic review
- COVID-19
- Coronavirus
- research funding
- coordination
- global health policy

---

**Grant information:** The COVID CIRCLE initiative is funded by Wellcome, UK DHSC and UKRI. COVID CIRCLE is also supported by core funding to UKCDR from DFID, UK BEIS, UKRI, UK DHSC, Wellcome and DEFRA and by in-kind contributions from the GloPID-R Secretariat funded by the European Union’s Horizon 2020 Research and Innovation Programme under grant agreements 643434 and 874667

**Copyright:** © 2022 Bucher A et al. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

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

**First published:** 08 Sep 2020, 5:209 https://doi.org/10.12688/wellcomeopenres.16259.1

---

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

**First published:** 08 Sep 2020, 5:209 https://doi.org/10.12688/wellcomeopenres.16259.1
This eighth version of the paper provides a seventh three-month update to the living review, on data in the tracker collected up to the 15th April 2022. The analysis is now more comprehensive of the global funding landscape, with the addition of more than 1,000 projects to the database, funded by 319 funders, taking place across 157 countries representing an investment of at least $6.2 billion. All data, tables and figures have been updated to reflect the additional data analysed and minor modifications to the results and discussion text have been made to reflect these updated analyses and the stage of the COVID-19 pandemic including the addition of one new reference on the animal/human interface for the origins of COVID-19. For the fourth time in this iteration, the projects are additionally mapped against the research priorities identified in the United Nations Research Roadmap for the COVID-19 Recovery. New research funding for COVID-19 has continued to plateau, making it even more important to coordinate to ensure funding is targeted towards those research areas, locations and populations where there is greatest continued unmet research need.

Any further responses from the reviewers can be found at the end of the article.

Glossary
ALCS - American Council of Learned Societies
AFD - Agence Française de Développement (French Development Agency)
AMED - Agency for Medical Research and Development (Japan)
ANID - Agencia Nacional de Investigación y Desarrollo (Chilean National Agency for Research and Development)
ANR - Agence nationale de la recherche (National Research Agency)
ANRS - Agence nationale de recherche sur le sida et les hépatites virale (National Agency for AIDS Research)
APPRISE - Australian Partnership for Preparedness Research on Infectious Diseases Emergencies
ARAMIS - Administration Research Actions Management Information System
AUF - L’Agence Universitaire de la Francophonie (Francophone University Agency)
BBVA - Banco Bilbao Vizcaya Argentaria (Bilbao Vizcaya Argentaria Bank)
BMBF - Bundesministerium für Bildung und Forschung (German Federal Ministry of Education and Research)
BNSF - Bulgaria National Science Fund
BPI-France - Banque publique d’investissement (Public Investment Bank)
BRICS STI Framework - BRICS Nations (Brazil, Russia, India, China, South Africa) Science, Technology, and Innovation Framework
BSAC - British Society for Antimicrobial Chemotherapy
C3.ai DTI - C3.ai Digital Transformation Institute
CABHI - Centre for Aging + Brain Health Innovation
CANSSI - Canadian Statistical Sciences Institute
CAPNETZ - Kompetenznetzwerk Ambulant erworbene Pneumonie (Competence Network Community Acquired Pneumonia)
CDC - Centers for Disease Control and Prevention
CDMRP - Congressionally Directed Medical Research Programs
CEPI - Coalition for Epidemic Preparedness Innovations
CIDRI-Africa - Wellcome Centre for Infectious Diseases Research in Africa
CIHR - Canadian Institutes of Health Research
CIRAD - Centre de coopération internationale en recherche agronomique pour le développement (French Agricultural Research Centre for International Development)
CNRS - Conseil National de la Recherche Scientifique (National Council for Scientific Research of Lebanon)
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)
CONACYT Paraguay - Consejo Nacional de Ciencia y Tecnología (Paraguay National Council of Science and Technology)
CONCYTEC Peru - Consejo Nacional de Ciencia, Tecnología e Innovación Tecnológica (Peruvian National Council of Science, Technology and Technological Innovation)
CORFO - Corporación de Fomento de la Producción (Production Development Corporation)
CREID - Centre of Research Excellence in Emerging Infectious Diseases
CRUE - Centro Regulador de Urgencias y Emergencias (Regulatory Center for Emergencies)
CTSI - University of Pittsburgh Clinical and Translational Science Institute
DBT - Department of Biotechnology India
DDR&D - Directorate of Defense Research and Development
DEFRA - Department for Environment, Food and Rural Affairs
DFG - Deutsche Forschungsgemeinschaft (German Research Foundation)
DFID - Department for International Development
DIM-ELICIT - Donner de la puissance aux sciences de la vie avec les technologies innovantes - Empowering Life sCiences with Innovative Technologies
DPI - Decanato de Pesquisa e Inovação (Dean of Research and Innovation)

DRDO - Defence Research and Development Organisation

e-Asia JRP - East Asia Science and Innovation Area Joint Research Program

EC - European Commission

EDCTP - European & Developing Countries Clinical Trials Partnership

FACEPE - Fundação de Amparo à Ciência e Tecnologia do Estado de Pernambuco (Foundation for the Support of Science and Technology of the State of Pernambuco)

FAPDF - Fundação de Apoio à Pesquisa do Distrito Federal (Federal District Research Support Foundation)

FAPEAL - Fundação de Amparo à Pesquisa do Estado de Alagoas (Research Support Foundation of the State of Alagoas)

FAPEAM - Fundação de Amparo à Pesquisa do Estado do Amazonas (Amazonas State Research Support Foundation)

FAPEAP - Fundação de Amparo à Pesquisa do Amapá (Amapá Research Support Foundation)

FAPEG - Fundação de Amparo à Pesquisa do Estado de Goiás (Goiás State Research Support Foundation)

FAPEMA - Fundação de Amparo à Pesquisa e ao Desenvolvimento Científico e Tecnológico do Maranhão (Foundation for the Support of Research and Scientific and Technological Development of Maranhão)

FAPEMIG - Fundação de Amparo à Pesquisa do Estado de Minas Gerais (Minas Gerais State Research Support Foundation)

FAPEPI - Fundação de Amparo à Pesquisa do Estado do Piauí (Piauí State Research Support Foundation)

FAPERGS - Fundação de Amparo à Pesquisa do Estado do Rio Grande do Sul (Research Support Foundation of the State of Rio Grande do Sul)

FAPERJ - Fundação de Amparo à Pesquisa do Estado do Rio de Janeiro (Research Foundation of the State of Rio de Janeiro)

FAPES - Fundação de Assistência e Previdência Social (Social Welfare and Assistance Foundation)

FAPESB - Fundação de Amparo à Pesquisa do Estado da Bahia (Bahia Research Support Foundation)

FAPESC - Fundação de Amparo à Pesquisa e Inovação do Estado de Santa Catarina (Santa Catarina State Research and Innovation Support Foundation)

FAPESP - Fundação de Amparo à Pesquisa do Estado de São Paulo (São Paulo Research Foundation)

FAPESQ - Fundação de Apoio à Pesquisa do Estado da Paraíba (Paraíba Research Support Foundation)

FCDO - (formerly DFID) - Foreign, Commonwealth and Development Office

FCT - Fundação para a Ciência e Tecnologia (foundation for Science and Technology)

FERCAP - Forum for Ethical Review Committees in Asia and the Western Pacific

FFAR - Foundation for Food and Agriculture Research

FFG - Österreichische Forschungsförderungsgesellschaft (Austrian Research Promotion Agency)

FNRS - Fonds de la Recherche Scientifique (National Fund for Scientific Research)

FORE - Foundation for Opioid Response Efforts

FUNCAP - Fundação Cearense de Apoio ao Desenvolvimento Científico e Tecnológico (Cearense Foundation for Scientific and Technological Development Support)

FUNDECT - Fundação de Apoio ao Desenvolvimento do Ensino, Ciência e Tecnologia do Estado de Mato Grosso do Sul (Support Foundation for the Development of Education, Science and Technology of the State of Mato Grosso do Sul)

FWF - Fonds zur Förderung der wissenschaftlichen Forschung (Austrian Science Fund)

FWO - Fonds voor Wetenschappelijk Onderzoek – Vlaanderen (Research Foundation Flanders)

G²LMILIC - Growth and Labour Markets in Low Income Countries Programme

HRB - Health Research Board

HRZZ - Hrvarske Zaklade za ananost (Croatian Science Foundation)

ICGEB - International Centre for Genetic Engineering and Biotechnology

ICMR - Indian Council of Medical Research

IDA Ireland - Investment Promotion & Development Agency Ireland

IDRC - International Development Research Centre

HICIETI - Instituto Hondureño de Ciencia y Tecnología (Honduran Institute of Science and Technology)

IHU - Institut Hospitalo-Universitaire en Maladies Infectieuses de Marseille (Marseille University Hospital Institute for Infectious Diseases)

INSERM - Institut national de la santé et de la recherche médicale (National Institute of Health and Medical Research)

IRD - L’Institut de recherche pour le développement (Development Research Institute)
IRSS - Institut de recherche Robert-Sauvé en santé et en sécurité du travail (Robert-Sauvé Research Institute in Occupational Health and Safety)

ISCIII - Instituto de Salud Carlos III (Carlos III Health Institute)

IZA - Forschungsinstitut zur Zukunft der Arbeit (Institute of Labor Economics)

MBIE - New Zealand Ministry of Business, Innovation and Employment

MINCTCI - Ministerio de Ciencia, Tecnología, Conocimiento e Innovación (Chilean Ministry of Science, Technology, Knowledge and Innovation)

MINCYT Argentina - Ministerio de Ciencia, Tecnología e Innovación (Argentina Ministry of Science, Technology and Innovation)

MinScience Colombia - Colombian Ministry of Science

MIUR - Ministero dell’Istruzione, dell’Università e della Ricerca (Italian Ministry of Education, University and Research)

NASA - National Aeronautics and Space Administration

NBHRF - New Brunswick Health Research Foundation

NCSEHE - National Centre for Student Equity in Higher Education

NHMRC - National Health and Medical Research Council

NIH - National Institutes of Health

NIHR - National Institute for Health Research

NMRC - National Medical Research Council (Singapore)

NORCE - Norwegian Research Centre

NSERC - Natural Sciences and Engineering Research Council

NSF - National Science Foundation

NSFC - National Natural Science Foundation

NWO - Nederlandse Organisatie voor Wetenschappelijk Onderzoek (Dutch Research Council)

NYU - New York University

OFSP - Office fédéral de la santé publique (Federal Office of Public Health)

OSAV - Office Fédéral de la sécurité alimentaire et des affaires vétérinaires (Federal Office for food safety and veterinary affairs)

OUCRU - Oxford University Clinical Research Unit

PCHRD - Philippine Council for Health Research and Development

PCORI - Patient-Centered Outcomes Research Institute

PEDL - Private Enterprise Development in Low-Income Countries

PRACE – Partnership for Advanced Computing in Europe

RBWH - Royal Brisbane and Women’s Hospital

REACTing - REsearch and ACTion Targeting Emerging Infectious Diseases

RIKEN - Kokuritsu Kenkyū Kōhō Kenkyūshō (Institute of Physical and Chemical Research)

RSTMH - Royal Society of Tropical Medicine and Hygiene

SENACYT Panama - Secretaría Nacional de Ciencia, tecnología e Innovación (Panama National Secretariat for Science, Technology and Innovation)

SEPAR - Sociedad Española de Neumología y Cirugía Torácica (Spanish Society of Pneumology and Thoracic Surgery)

SERB India - Science and Engineering Research Board India

SFI - Science Foundation Ireland

SFOE - Swiss Federal Office of Energy

SGC - Sino-German Center for Research Promotion

SNF - Schweizerischer Nationalfonds zur Förderung der wissenschaftlichen Forschung (Swiss National Science Foundation)

SNSF - Swiss National Science Foundation

SSHRC - Social Sciences and Humanities Research Council

STINT - Stiftelsen för internationalisering av högre utbildning och forskning (Swedish Foundation for International Cooperation in Research and Higher Education)

SVRI - Sexual Violence Research Initiative

TUBITAK - Türkiye Bilimsel ve Teknolojik Araştırma Kurumu (Scientific and Technological Research Council of Turkey)

UCB - Union Chimique Belge (Belgian Chemical Union)

UCL - University College London

UFRJ - Universidade Federal do Rio de Janeiro (Federal University of Rio de Janeiro)

UFI - Udannelses- og Forskningsministeriet (Danish Ministry of Higher Education and Science)

UKRI - UK Research and Innovation

UNICEF - United Nations Children’s Fund

WHO - World Health Organization

WWTF Austria - Wiener Wissenschafts-, Forschungs- und Technologiefonds (Vienna Science and Technology Fund)

ZonMw - Nederlandse organisatie voor gezondheidsonderzoek en zorginnovatie (Netherlands Organisation for Health Research and Development)
**Introduction**

Researchers and research funders in global health have been preparing for a pandemic such as that caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) for decades; however, the urgency and global scale of the research needs and response have been difficult to respond to and coordinate. Research funders have rapidly supported repurposing of existing studies and launched rapid funding calls to support research into the most pressing needs. Lessons in expediting research have been learnt from undertaking research in the recent Democratic Republic of Congo Ebola outbreaks and West Africa Ebola, Zika and SARS epidemics, however the truly global nature of the coronavirus disease 2019 (COVID-19) pandemic has led to unprecedented needs and challenges for coordination.

The World Health Organisation (WHO) triggered a rapid response, building on the R&D Blueprint, and co-organised the Global Research and Innovation Forum: Towards a Research Roadmap for the 2019 Novel Coronavirus meeting with the Global Research Collaboration for Infectious Disease Preparedness (GloPID-R) on February 11–12, 2020 at which over 400 global experts identified research priorities for COVID-19. In March 2020, the WHO released the WHO and GloPID-R Coordinated Global Research Roadmap: 2019 Novel Coronavirus (WHO Roadmap) to coordinate and accelerate the global research response against the identified priorities. The WHO Roadmap is an unprecedented galvanising document for global research collaboration. This project builds on this to help shepherd the global response.

In a joint effort to further coordinate and synergise the funding of research to address the WHO Roadmap identified priority areas, the UK Collaborative on Development Research (UKCDR) partnered with GloPID-R to launch the COVID-19 Research Project Tracker (the tracker) on April 3, 2020. The tracker is a live database of funded research projects across the world related to the current COVID-19 pandemic. It includes both newly funded research projects and repurposed research projects across all disciplines and categorises them against the mid- and long-term research and development priorities and sub-priorities identified in the WHO Roadmap. Mapping of projects as soon as funding is announced allows visibility of the funded research portfolio well in advance of any outputs such as publications. To date, the database has been accessed over 39 thousand times and we have had active engagement (beyond data entry) with over 30 funders, the WHO (and associated COVID-19 research priority area groups) and research groups regarding its use and the living mapping review. The data is also being extracted by several other funding tracking tools (including Europe Pub Med Central).

The UKCDR Epidemics Preparedness and Response Funders Group and GloPID-R Funders groups have each been meeting frequently during the pandemic to strengthen UK and global COVID-19 research funding coordination activities respectively. Their work is informed by the data and analysis from the tracker. Several members of both organisations have launched calls for research on COVID-19 in low and middle-income country (LMIC) settings. There is a particular concern that due to the resource limitations in LMICs an uncoordinated approach could potentially lead to unaddressed local research needs, failure of research to inform policy or unsustainable research capacity to respond to future outbreaks. The UKCDR and GloPID-R funders groups have further strengthened their response by agreeing to a set of Funder Principles for supporting high-quality research for the most pressing global needs in epidemics and pandemics and with the formation of a jointly hosted initiative for COVID-19 Research Coordination and Learning (COVID CIRCLE), encompassing the tracker and with a particular focus on resource-limited settings.

As part of the COVID CIRCLE initiative, this living mapping review has been established to regularly update and incorporate newly funded research projects as they become available and review their alignment to the WHO Roadmap priorities. A living mapping review (LMR) is needed due to the rapidly expanding number of funded research projects and the importance of the review to inform funding decision making. Here, in version eight, we present the results of the seventh three-month update of all research projects within the tracker as of 15th April 2022 and a descriptive and thematic analysis to aid interpretation of the global COVID-19 funded research portfolio. We have additionally now added a mapping of these same research projects against research priorities identified in the United Nations (UN) Research Roadmap for the COVID-19 Recovery. We previously published a more detailed analysis on the African continent specific baseline data from this tracker in collaboration with the African Academy of Sciences.

**Methods**

**Protocol for LMR**

The LMR protocol outlined herein was prospectively designed. Due to the rapid need for this project to be conducted to inform research responses during the pandemic, data extraction commenced before the protocol could be formally registered with PROSPERO. The protocol is outlined in this paper.

**Rationale for use of living method**

Research funding bodies have responded rapidly to the COVID-19 pandemic through repurposing existing grants and rapidly funding projects with both rolling and one-off funding calls. This has resulted in new research projects being funded at short intervals necessitating a living review for this work. The regular update of this review will help coordinate ongoing researcher and funder responses.

**Eligibility criteria**

All research projects funded by any research funder around the world (including regional funding organisations, national research funders and non-profit/ philanthropic organisations), with a focus on COVID-19 were eligible for inclusion in this analysis. This includes data from all types of research.
activities and was not limited to biomedical and health research. Furthermore, this analysis includes grants identified by funders as having been repurposed to address COVID-19 research priorities.

Information sources and search strategy
The database and subsequent analysis make use of data from publicly-announced COVID-19 research grants and were obtained using one of two methods. Data was either obtained through direct communication with research funders by requesting the completion of a template spreadsheet (Extended data 1). These requests were made to UKCDR and GloPID-R funder groups members on a regular basis (as part of funder coordination meetings) and to wider funder contacts beyond these groups. Alternatively, data were also obtained from online databases belonging to research funders using “COVID” and/or “coronavirus” and/or “nCoV” and/or “sars-cov-2” as search terms (see Extended Data 2). New funders were identified by their association with other funders when looking for newly published data from funders already on the tracker. This could have been through results of co-funding, being members of the same funders’ networks, etc. This then formed the basis of a series of internet searches to check whether these new funders awarded any COVID-19 research and, if so, whether they published the results of these funding calls. The tracker remains open to the submission of new funding data relating to COVID-19 from any global funder at any time. Screening of submitted data occurs on a weekly basis.

As the database is updated, a regular review is conducted to identify duplicate entries. Where duplicates are removed from the tracker the entry with the most detailed information is retained.

Though the set of data fields varied between funders, the data fields presented in Table 1 were considered a priority for the purposes of the tracker and subsequent analyses:

Update schedule
All figures will be updated on a three-monthly basis; the discussion will also be revised to reflect any changes and trends over time. This living review will continue to be updated for the duration of the COVID CIRCLE initiative funding. The frequency of screening will not be reduced for the duration of COVID CIRCLE, although updates will only continue where new grants are included.

Manually coded data fields
Data entry of additional manually classified variables was completed by one reviewer with each variable cross-checked

<table>
<thead>
<tr>
<th>Data Field</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>Scientific summary of the project</td>
</tr>
<tr>
<td>Amount awarded</td>
<td>Total amount awarded by the responsible funder for the duration of the project (with currency stated)</td>
</tr>
<tr>
<td>Country(-ies) where studies are being conducted</td>
<td>All countries where research is being conducted</td>
</tr>
<tr>
<td>Funder(s)</td>
<td>The names of all funding organisations (including co-funding)</td>
</tr>
<tr>
<td>Lead institution</td>
<td>The name of the organisation that holds the grant and is leading the research</td>
</tr>
<tr>
<td>Local implementing partner(s)</td>
<td>The name of any partner institutions located in the country(-ies) where the study is being conducted</td>
</tr>
<tr>
<td>Principal investigator</td>
<td>Name of the awarded project's lead investigator based at the lead institution (primarily used for project de-duplication)</td>
</tr>
<tr>
<td>Project ID/reference number</td>
<td>Any unique reference number / project ID assigned by the funder organisation to this project (primarily used for project de-duplication)</td>
</tr>
<tr>
<td>Project title</td>
<td>Title of the research project</td>
</tr>
<tr>
<td>Start/end date</td>
<td>Start and end dates of the project</td>
</tr>
</tbody>
</table>
by a second reviewer. Abstracts in languages other than English were coded by project team members fluent in those languages or translated using Google Translate. Projects were coded against the following classifications:

1. WHO medium-long term research priorities and sub-priorities
Projects were assigned to one or more WHO priority areas of primary focus (Extended data 3). An assignment of ‘N/A’ was made where: information provided was insufficient for classification; funds were allocated for research administration; or where projects clearly fell outside the WHO broad priority areas. Subsequently, projects were assigned to appropriate WHO sub-priority area(s). The assignment of ‘N/A’ was made if insufficient information limited further sub-categorisation or the projects fell outside the WHO sub-priority areas. In addition, suitable secondary priority area(s) with corresponding sub-priority(ies) were determined for those projects that significantly addressed other priority areas. Hence, projects were assigned with multiple primary and/or secondary WHO priority and sub-priority areas of research focus. The priority list will be updated if future iterations of the WHO Roadmap are released.

2. Emergent categories for research falling outside the WHO priority classification
For those projects that were not considered as addressing any of the WHO Research Priorities, they were assigned ‘N/A’ and new sub-priorities were developed and assigned on an initial data set of 400 projects. An inductive approach was used to develop new codes that emerged from the funded research and themes were confirmed through an iterative process through the projects in the baseline assessment. Six new sub-priority codes were defined under the social science priority (mental health; digital health; policy and economy; education; logistics and food security). A new priority focusing on the environmental impacts of COVID-19, was developed as well. All newly identified categories were validated using the full baseline dataset. In version two, one further new emergent category, long COVID, was identified within the clinical management priority, however this has now been reclassified as a cross-cutting theme (see below) due to research on long COVID now being funded across a range of research priority areas.

3. COVID-19 Research Priorities for LMICs
Research projects involving LMICs were additionally assessed for their alignment with the research priorities identified in a collaborative study conducted by the UKCDR, African Academy of Sciences (AAS) and the Global Health Network (TGHN) in May 202011,12. This study, which determined globally relevant COVID-19 research priorities with a specific focus on less-resourced countries, was based on earlier work by the AAS to determine the COVID-19 research priorities for Africa11 and the mid- to long-term research priorities summarized in the WHO Research Roadmap12. The study findings, published in August 2020, outline existing WHO research priorities which require greater research emphasis and new research priority areas not captured in the WHO Roadmap or identified in the AAS survey (Extended data 4). Each funded research project involving LMICs was assigned to one of the new categories outlined in Supplementary material 2 or noted if it fell outside both the new AAS priorities and the new priorities identified by the UKCDR/AAS/TGHN study.

4. UN Research Roadmap for the COVID-19 Recovery
The UN Research Roadmap for the COVID-19 Recovery was published in November 2020, covering the breadth of research needed leverage the “power of science in support of a better socio-economic recovery and a more equitable, resilient and sustainable future.” Mapping of the 16,353 studies against the UN Research Roadmap priorities proceeded in two steps. First, preliminary exclusion/inclusion criteria were developed based on the mapping of 25 UN Research Roadmap research priorities to the WHO Research Roadmap mid- and long-term research priorities, sub-priorities, emergent categories (from point 2 above). Projects were included for review if they were previously tagged with at least one WHO priority or sub-priority area that overlapped with UN Research Roadmap research priorities (Table 2). Any study coded with both included and excluded priorities was included for further examination.

The remaining projects were then individually examined and, where appropriate, were assigned to one or more of the research priorities identified in the UN Research Roadmap (25 research priorities in total, across five pillars: health systems and services, social protection and basic services, economic response and recovery, macroeconomic policies and multilateral cooperation, and social cohesion and community resilience). If projects significantly addressed more than one research priority, secondary sub-priorities were assigned. Where projects met the inclusion criteria, but insufficient information was available for further classification, “N/A” was assigned and a project description recorded.

<table>
<thead>
<tr>
<th>Inclusion</th>
<th>1f, 2, 2a, 2b, 2c, 3d, 5, 5a, 5b, 5c, 5d, 8, 8a, 8b, 8c, 8d, 8e, 9, 9a, 9b, 9c, 9d, 9e, 9f, N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exclusion</td>
<td>1a, 1b, 1c, 1d, 1e, 3a, 3b, 3c, 4, 4a, 4b, 4c, 4d, 4e, 6, 6a, 6b, 6c, 7, 7a, 7b, N/A – with more information required</td>
</tr>
</tbody>
</table>
5. Cross-cutting themes
During the data coding process, a number of cross-cutting themes identified by the project team were coded for analysis (classified as yes or no): capacity strengthening; cohorts; gender; implementation; indirect health impacts; innovation; long COVID; modelling; new variants; pandemic preparedness; and repurposed projects.

6. Study population
A study population categorisation structure was proposed using an inductive approach on an initial data set of 400 projects and validated using the full data set (at the time of version 1), allowing the categories to be specific to the populations represented in the funded research.

For the purposes of this analysis, a hierarchical categorisation system was produced to examine the study populations of the research projects included in the tracker. At the highest levels, research projects are assessed on whether they involve animal populations, human populations, literature reviews, policy analysis or only focus on the virus itself. Research projects focused on human populations, were classified against three additional sub-categories. Table 3 outlines the categories, sub-categories and levels in full.

Synthesis of results
Descriptive and comparative analyses are used in this analysis to present a description of funded COVID-19 research included in the tracker database as of 15th April 2022.

The data used for this analysis can be obtained from the COVID-19 Research Project Tracker page on UKCDR’s website, as mentioned in the data availability statement. Data on the tracker (and subsequent analyses) will continue to be updated as more data becomes available and are obtained by the project team.

The charts and figures produced in this analysis were produced using Microsoft Office (Office 365 versions of Excel and PowerPoint).

Limitations of the data
Among the main challenges of the analysis is the varying completeness of data which led to less refined categorisation (assignment of projects to broad priority but not sub-priority areas) where the qualitative details of projects provided were insufficient. Therefore, the assigned priority areas may have failed to capture all aspects of the projects relevant to the WHO Roadmap. The same can be said for any value that was assigned to a given research project by the project team, including the study population and type of research activity. The data validation process by reviewers with expertise in global health research, policy, and funding outlined in the Project Selection section was used to address this and ensure that any assigned value was as accurate as possible, given the information provided.

Data on funding amounts was available from 166 of 319 funders (61.3% of all projects) and as a result this analysis is limited in providing a full financial profile of COVID-19 research funding investments. However, as the analysis makes use of all publicly available information, it can therefore be considered the most comprehensive characterisation possible.

At a higher level, the comprehensiveness of the tracker is limited to the funders that have either provided data for the tracker or had their data extracted from online sources (if available) and by the quality of that available data. In this respect, there were challenges in engaging with (and obtaining data from) health research funders beyond existing networks either due to a lack of contacts or capacity from funders to contribute to the project (especially for funders whose award information is not in English). Few funders have yet identified or made available details on grants repurposed towards COVID-19 to date although we continue to request this.

Risk of bias
This LMR of funded COVID-19 research projects uses descriptive and thematic analysis to summarise the scope of funded COVID-19 research projects. No attempts are made to assess the quality of individual studies or whether the studies meet their objectives. The potential sources of bias with project selection, quality of data reviewed, and data extraction and classification are addressed by robust fortnightly searches, template completion by funders and independent assessment and review during project classification respectively, as mentioned in the Information Sources and Search Strategy.

While the intention of the tracker and subsequent analyses are to provide as comprehensive a picture as possible of the COVID-19 research landscape, the data obtained for the tracker is more likely to be derived from funders of research that are members of UKCDR (all UK and broad disciplinary focus) and/or GloPID-R (global membership spanning high-income countries, or HICs, to low-income countries, or LICs, with a majority of national funders, and a biomedical focus). This would likely skew the results to show that more research being funded from these organisations and reflect trends in their respective portfolios (in terms of location, research focus and research activity type) than may necessarily be the case of the landscape more generally. In particular, more than half of all the projects included in the latest version of the tracker (50.8%) are from just 10 funders based in 5 high-income countries.

Results
Project selection
In total, 17,772 projects were assessed against the eligibility criteria outlined in the methodology and 1,419 were excluded for being duplicate projects or failing to meet the eligibility criteria as they were not related to COVID-19 (PRISMA Flow Diagram provided in Figure 1). The remaining 16,353 projects were assigned to the manually-coded data fields by project team members before being validated by an independent reviewer not involved with the initial screening and assigning process. This represents an increase of 1,575 projects as a result of the update to the analysis. All reviewers have broad expertise in global health research, policy, and funding.
Table 3. Study population categorisation system. The latest and previous versions of this table are available as Extended data.

<table>
<thead>
<tr>
<th>Level</th>
<th>Category</th>
<th>Sub-category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Population</td>
<td>Animal population</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Human population</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Literature reviews</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Policy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Virus</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other</td>
</tr>
<tr>
<td>2</td>
<td>Human sub-population</td>
<td>Adults</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adults- women</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adolescents</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Children</td>
</tr>
<tr>
<td>3a</td>
<td>Population group- vulnerable</td>
<td>Care home patients</td>
</tr>
<tr>
<td></td>
<td>populations</td>
<td>Disabled</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Domestic Violence Victims</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Elderly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High risk individuals (defined as such in the study)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LGBTQI+ community</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Minority communities (defined as such in the study)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neonates</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pregnant women</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Refugees</td>
</tr>
<tr>
<td>3b</td>
<td>Population group- Frontline</td>
<td>Care home staff</td>
</tr>
<tr>
<td></td>
<td>workers - Healthcare workers</td>
<td>Doctors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Informal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nurses</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Paramedics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Social care workers</td>
</tr>
<tr>
<td>3c</td>
<td>Population group- Frontline</td>
<td>Firefighters</td>
</tr>
<tr>
<td></td>
<td>workers - Non-healthcare</td>
<td>Sanitation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Volunteers</td>
</tr>
<tr>
<td>4</td>
<td>COVID-19 infection status</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Negative – Recovered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Positive – Severe</td>
</tr>
</tbody>
</table>

Project characteristics

Summaries of the characteristics of the 16,353 projects included in the latest version of the tracker are provided in the discussion of the results (below) which breaks down the projects by:

- Funder;
- Priority and sub-priority areas;
- Location;
- Activity type;
- Study population.

A full list of the projects is provided as underlying data.

Project funder. The 16,353 projects included in the latest version of the tracker comprises of data compiled from 319 research funders based in 56 different countries representing an investment of at least $6.2 billion (funding amounts only available for 61.3% of projects) (Figure 2). This represents

---

**Figure 1. PRISMA flow diagram.** The latest and previous versions of this figure are available as Extended data.

---

**PRISMA 2009 Flow Diagram**

- Records identified through database searching and collection (n = 17,772)
- Additional records identified through other sources
  - Duplicates removed (n = 288)
  - Records excluded (n = 1,131) Not related to COVID-19
- Records screened and assessed for eligibility (n = 16,353)
- Projects included in quantitative synthesis (n = 16,353)
<table>
<thead>
<tr>
<th>Funding Source</th>
<th>Amount</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>UKRI (€983.3m)</td>
<td>3,275</td>
<td></td>
</tr>
<tr>
<td>NIH (€1.8b)</td>
<td>1,413</td>
<td></td>
</tr>
<tr>
<td>NSF (€268.3m)</td>
<td>1,223</td>
<td></td>
</tr>
<tr>
<td>NMRC (N/A)</td>
<td>472</td>
<td></td>
</tr>
<tr>
<td>CIHR (€181.9m)</td>
<td>453</td>
<td></td>
</tr>
<tr>
<td>NSERC (€18.1m)</td>
<td>377</td>
<td></td>
</tr>
<tr>
<td>ANR (€168k)</td>
<td>259</td>
<td></td>
</tr>
<tr>
<td>Johns Hopkins Uni (N/A)</td>
<td>205</td>
<td></td>
</tr>
<tr>
<td>Mincyt (€6.3m)</td>
<td>189</td>
<td></td>
</tr>
<tr>
<td>CNRST (N/A)</td>
<td>177</td>
<td></td>
</tr>
<tr>
<td>Medical Uni Vienna (N/A)</td>
<td>171</td>
<td></td>
</tr>
<tr>
<td>BMBF (€239.2m)</td>
<td>155</td>
<td></td>
</tr>
<tr>
<td>DPI (€5.7m)</td>
<td>154</td>
<td></td>
</tr>
<tr>
<td>MIUR (€9.3m)</td>
<td>153</td>
<td></td>
</tr>
<tr>
<td>EC (€488.5m)</td>
<td>148</td>
<td></td>
</tr>
<tr>
<td>ISCII (€5.6m)</td>
<td>143</td>
<td></td>
</tr>
<tr>
<td>Volkswagen Stiftung (N/A)</td>
<td>138</td>
<td></td>
</tr>
<tr>
<td>FAPERJ (N/A)</td>
<td>136</td>
<td></td>
</tr>
<tr>
<td>FCT Portugal (€4.3m)</td>
<td>136</td>
<td></td>
</tr>
<tr>
<td>ZonMw (€17.4m)</td>
<td>135</td>
<td></td>
</tr>
<tr>
<td>CONACYT Mexico (N/A)</td>
<td>132</td>
<td></td>
</tr>
<tr>
<td>KAKENHI (€7.2m)</td>
<td>128</td>
<td></td>
</tr>
<tr>
<td>PCORI (€65.9m)</td>
<td>124</td>
<td></td>
</tr>
<tr>
<td>NIHR (€85.9m)</td>
<td>123</td>
<td></td>
</tr>
<tr>
<td>NOW (€345k)</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>Emergent Ventures Fast Grants (N/A)</td>
<td>112</td>
<td></td>
</tr>
</tbody>
</table>

Funding figures available for 61.3% of projects included in the latest version of the tracker database as not all funders provided financial information.
Figure 2. Number of Projects by Research Funder (funders with at least 110 projects in the latest version of the tracker displayed). Known funding amounts indicated in brackets. Funders with less than 110 projects: University of Minnesota (107 projects, $160k); DFG (106 projects, $N/A); FAPESP (106 projects, $2.3m); AMED (104 projects, $N/A); SERB India (95 projects, $139k); NHRMC (89 projects, $66.1m); British Academy (85 projects, $973k); SFI Ireland (85 projects, $5.9m); SNF (83 projects, $41m); Robert Wood Johnson Foundation (81 projects, $21m); NRF South Africa (77 projects, $7k); Novo Nordisk Foundation (73 projects, $24.7m); Indian Council of Social Science Research (72 projects, $N/A); FAPES (71 projects, $828k); TUBITAK (71 projects, $N/A); UKRI / National Institute for Health Research (69 projects, $53.8m); Agencia Nacional de Investigación y Desarrollo Chile (68 projects, $N/A); EOSC (66 projects, $N/A); Junta de Castilla y Leon - Consejeria de Sanidad (66 projects, $468k); RCN Norway (65 projects, $32.2m); CSO Scotland (63 projects, $9.4m); IDRC (63 projects, $35.2m); MINICIT - Chile / Agencia Nacional de Investigación y Desarrollo Chile (63 projects, $N/A); Institut Pasteur (61 projects, $N/A); Social Sciences Research Council (60 projects, $N/A); CONCYTEC Peru (58 projects, $2.2m); HRB Ireland / Irish Research Council (57 projects, $4.8m); National Science Center Poland (57 projects, $9.9m); FAPERGS (56 projects, $N/A); Leibniz Association (56 projects, $N/A); MBIE New Zealand (55 projects, $20.9m); Academy of Finland (54 projects, $25.2m); Luxembourg National Research Fund (51 projects, $2.9m); Ministère des Solidarités et de la Santé France (50 projects, $N/A); CRUE/Santander (47 projects, $6.7m); FFG (47 projects, $N/A); FWF Austria (43 projects, $13.4m); Innovate Peru (42 projects, $N/A); FORMAS (41 projects, $6.4m); PCHRD (39 projects, $N/A); Department of Science and Technology - India (38 projects, $N/A); Estonian Research Council (38 projects, $9.2m); IZA Institute of Labor Economics (38 projects, $N/A); FAPEAM (37 projects, $1.5m); TVS Foundation (36 projects, $15.2m); Southeast Asia Engineering Education Development Network (35 projects, $N/A); FNRS (33 projects, $285k); IJAF (33 projects, $N/A); Wood Johnson Foundation (32 projects, $N/A); ANRS (32 projects, $7.1m); Government of Ontario (32 projects, $1m); Heath Research Council New Zealand (32 projects, $7.3m); Innovationsfonden Denmark (32 projects, $N/A); Ministére de l'Education Nationale / Ministère de la Recherche et de l'Enseignement Supérieur / Ministère de l'Enseignement Supérieur et de la Recherche (32 projects, $9.4m); CONACYT - Paraguay (31 projects, $1.4m); Fraunhofer-Gesellschaft (31 projects, $N/A); International Growth Centre (31 projects, $N/A); PRACE (31 projects, $N/A); Australian Government Medical Research Future Fund (29 projects, $46.8m); CNRS Lebanon (29 projects, $N/A); EDCTP (29 projects, $12.5m); FAPEMA (29 projects, $253k); Saskatchewan Health Research Foundation (29 projects, $182k); Vinnova (29 projects, $6.2m); Agency for Healthcare Research and Quality (28 projects, $15.8m); UCL (28 projects, $53k); University of Michigan (28 projects, $N/A); Russell Sage Foundation (27 projects, $2.7m); C3.al DTI (26 projects, $N/A); Michael Smith Foundation (26 projects, $N/A); University of Colorado (26 projects, $N/A); BIRAC (25 projects, $N/A); Qatar National Research Foundation (25 projects, $N/A); RAENG (25 projects, $649k); Spencer Foundation (25 projects, $N/A); CDMPR (24 projects, $56m); Goethe University (24 projects, $N/A); WWTF Austria (24 projects, $1.2m); FAPESB (23 projects, $N/A); FAPEQ (23 projects, $N/A); FAPEMIG (22 projects, $375k); New South Wales Government (22 projects, $N/A); The Ottawa Hospital Foundation (22 projects, $N/A); Wellcome (22 projects, $5m); BBVA Foundation (21 projects, $2.4m); Burnet Institute (21 projects, $N/A); CSRI (21 projects, $1m); FWO Belgium (21 projects, $5.5m); Nuffield Foundation (21 projects, $8.1m); SENACYT - Panama (21 projects, $3.6m); Yale University (21 projects, $N/A); American Heart Association (20 projects, $N/A); Government of Nepal (20 projects, $N/A); Instituto Nacional de Salud Peru (20 projects, $N/A); National Research, Development and Innovation Office (20 projects, $16.6m); REACTing/INSERM (20 projects, $N/A); SGC (20 projects, $N/A); Western University (20 projects, $3.6m); APPRISE (19 projects, $498k); BSAC (19 projects, $967k); UFM Denmark (19 projects, $14.1m); FRO (18 projects, $2.1m); Lundbeck Foundation (18 projects, $4.6m); Danish Independent Research Foundation (17 projects, $3.6m); Department of Science and Innovation - South Africa (17 projects, $4.4m); OUCRU (17 projects, $N/A); RSTMH / National Institute for Health Research (17 projects, $N/A); Agence nationale de la recherche / Other French Funders (16 projects, $1.3m); Cambridge Africa (16 projects, $N/A); FAPESP (16 projects, $57k); AUF (15 projects, $N/A); FCDO (formerly DFID) / National Institute for Health Research / Wellcome (15 projects, $1.4m); Fundação Araucária (15 projects, $334k); SSHRC (15 projects, $4.6m); GZLM/LLC (14 projects, $N/A); Innosuisse (14 projects, $2.9m); PEDL (14 projects, $N/A); Research Manitoba (14 projects, $N/A); SNF (14 projects, $5.8m); ARAMIS (13 projects, $1.6m); BNSF (13 projects, $1.3m); CORFO (13 projects, $N/A); LifeArc (13 projects, $N/A); NordForsk (13 projects, $N/A); NRF Kenya (13 projects, $N/A); Wellcome / FCDO (formerly DFID) (13 projects, $17.3m); African Academy of Sciences (12 projects, $2.3m); American Lung Association (12 projects, $N/A); American Society of Clinical Oncology (12 projects, $N/A); ASCRS (12 projects, $N/A); COVID-19 Therapeutics Accelerator (Wellcome / Bill & Melinda Gates Foundation) (12 projects, $N/A); FEPE (12 projects, $221k); Harrington Discovery Institute (12 projects, $N/A); North Carolina Biotechnology Center (12 projects, $239k); South African Medical Research Council (12 projects, $3.5m); University of New South Wales (12 projects, $N/A); Botnar Research Centre for Child Health (11 projects, $N/A); CEPI (11 projects, $1.2b); e-Asia JRP (11 projects, $N/A); HRZZ Croatia (11 projects, $N/A); ICGEB (11 projects, $N/A); IHCIEHT Honduras (11 projects, $N/A); Ministry of Health - Italy (11 projects, $8.2m); NORCE (11 projects, $N/A); OFSP (11 projects, $3.7m); Paul Ramsay Foundation (via APPRISE) (11 projects, $N/A); Roche (11 projects, $N/A); Abdul Latif Jameel Poverty Action Lab (10 projects, $N/A); American Diabetes Association (10 projects, $N/A); AXA (10 projects, $N/A); Carlsberg Foundation (5 projects, $6.7m); CIHR / Alberta Innovates (10 projects, $4.2m); Commonwealth Fund (10 projects, $2.3m); FAPDF (10 projects, $N/A); FAPEI (10 projects, $N/A); Higher Education Commission Pakistan (10 projects, $N/A); Indian Innovation (10 projects, $N/A); Therapeutic Innovation Australia (9 projects, $N/A); University of Maryland (10 projects, $N/A); Botnar Research Centre for Child Health (11 projects, $N/A); CEPI (11 projects, $1.2b); e-Asia JRP (11 projects, $N/A); MINICIT - Chile / Agencia Nacional de Investigación y Desarrollo Chile (11 projects, $N/A); Callaghan Innovation (9 projects, $1.1m); CANSSEI (9 projects, $N/A); Department of Science and Innovation - South Africa / Technology Innovation Agency (9 projects, $1.6m); Fundacion Mutua Madrileña (9 projects, $N/A); FUNDUCNT (9 projects, $38k); Genome BC / Michael Smith Foundation (9 projects, $N/A); Greenwall Foundation (9 projects, $737k); Instituto Evandro Chagas (9 projects, $N/A); Junta de Andalucía (9 projects, $424k); RBWH Foundation (9 projects, $N/A); AFD (8 projects, $12.7m); Finnish Institute for Health and Welfare (6 projects, $N/A); FUNCAP (8 projects, $N/A); Innovations for Poverty Action / FCDO (formerly DFID) (8 projects, $N/A); Peter Wall Institute (8 projects, $N/A); Peterson Foundation (8 projects, $N/A); Shastri Institute (8 projects, $8k); Universidad de los Llanos (8 projects, $N/A); Victoria State Government (8 projects, $N/A); Visegrad (8 projects, $235k); ACLS (7 projects, $N/A); Alberta Innovates (7 projects, $1.6m); American Thoracic Society (7 projects, $305k); American University of Beirut (7 projects, $N/A); APPRISE/CRED (7 projects, $N/A); Australian National University (7 projects, $N/A); Canadian Frailty Network (7 projects, $563k); DIM-ELICIT (7 projects, $N/A); FFA (7 projects, $563k); FORE (7 projects, $1.2m); Innovations for Poverty Action (7 projects, $N/A);
an increase of more than 4% in the number of funders (previously 306 funders based in 55 countries) since the previous version of the analysis.

See glossary for abbreviations and acronyms used in this figure.

With the updated data, approximately one quarter of funded projects in the tracker were awarded by funders based in the United Kingdom (23.9%)—ranking first among all countries, ahead of the United States (23.8%) and Canada (9.1%). In terms of known funding amounts, funders based in the United States ranked first among all countries, collectively investing $2.3 billion (36.8% of available financial data), ahead of the $1.2 billion (18.9%) invested by United Kingdom-based funders and $269.0 million (4.3%) by Canadian-based funders.

**Categorisation of projects against WHO Roadmap priorities & sub-priorities.** All projects were categorised against the priorities and sub-priorities identified by the WHO in their Coordinated Global Research Roadmap 2020, with several...
research projects being assigned multiple priority and/or sub-priority areas.

**WHO Priority Areas.** Figure 3 displays both the number of projects listed under each priority area and the known funding amounts (as not all funders provided financial information for their awarded research projects). The priority area under ‘Candidate Vaccines R&D’ ranks first among all nine priority areas with a known research funding amount of $2.0b (increasing by $34.8m since the update to the analysis).

However, while ranking first in terms of known funding amounts, the ‘Candidate Vaccines R&D’ priority area ranks seventh in terms of the total number of research projects (626), highlighting the different grant values for different types of research funded in response to the COVID-19 pandemic. The average known value of ‘Candidate Vaccines R&D’ projects was $3.7m – more than six-times the priority area with the second-largest average (‘Candidate Therapeutics R&D’ at $572k) and more than eighteen times the priority area with the smallest average, ‘Ethics considerations for research’ ($196k).

Following the inclusion of 1,575 additional projects to the tracker database, the two priority areas of ‘Animal and environmental research on the virus origin, and management measures at the human-animal interface’ (115 projects totalling $28.9m) and ‘Ethics considerations for research’ (236 projects totalling $43.4m) continue to receive comparatively little research attention from the fewest research funders (38 and 71, respectively, while the other priority areas average 197 funders). The cross-cutting nature of ethics considerations for research, however, means that much work on this will occur within other research projects and many of the research projects coded to ethics here are not solely on ethical considerations and therefore jointly coded to other areas.

**WHO Sub-Priority Areas.** Figure 4 shows how the 16,353 COVID-19 research projects included in the latest version of the tracker have been categorised against abbreviated versions of the 44 sub-priorities mentioned in the WHO Roadmap. The names of the sub-priorities are listed in full as Extended data.

The funding patterns at the WHO priority-level are reflected at the sub-priority level. Notably, eight of the ten sub-priorities with the greatest number of research projects are from the three priority areas with the greatest number of projects – namely ‘Virus: natural history, transmission and diagnostics’ (3 sub-priorities in the top 10), ‘Clinical Characterization and Management’ (3), and ‘Social sciences in the outbreak response’ (2).

Similarly, eight of the ten sub-priorities with the greatest investment totals are from priority areas ranked among the top four for funding amounts – namely ‘Virus: natural history, transmission and diagnostics’ (again with 3 sub-priorities in the top 10), ‘Clinical Characterization and Management’ (2),

---

*Figure 3. COVID-19 Research Projects Classified Against Priorities Outlined in WHO Coordinated Global Research Roadmap.*
### Virus: natural history, transmission and diagnostics

<table>
<thead>
<tr>
<th>Category</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic Products</td>
<td>$433.6m</td>
</tr>
<tr>
<td>Compartments, shedding and history</td>
<td>$259.8m</td>
</tr>
<tr>
<td>Phenotypic change and adaptation</td>
<td>$131.3m</td>
</tr>
<tr>
<td>Characterize immunity</td>
<td>$674.2m</td>
</tr>
<tr>
<td>Disease models</td>
<td>$68.9m</td>
</tr>
<tr>
<td>Virus stability</td>
<td>$25.4m</td>
</tr>
<tr>
<td>N/A</td>
<td>$23.7m</td>
</tr>
</tbody>
</table>

### Animal and environmental research...

<table>
<thead>
<tr>
<th>Category</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal source and transmission route</td>
<td>$26.7m</td>
</tr>
<tr>
<td>Spill-over risk factors</td>
<td>$2.5m</td>
</tr>
<tr>
<td>Human-animal risk reduction</td>
<td>$3.6m</td>
</tr>
<tr>
<td>N/A</td>
<td>$550k</td>
</tr>
</tbody>
</table>

### Epidemiological Studies

<table>
<thead>
<tr>
<th>Category</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission dynamics</td>
<td>$320.8m</td>
</tr>
<tr>
<td>Disease severity</td>
<td>$145.5m</td>
</tr>
<tr>
<td>Susceptibility</td>
<td>$69.0m</td>
</tr>
<tr>
<td>Control and mitigation measures</td>
<td>$129.6m</td>
</tr>
<tr>
<td>N/A</td>
<td>$46.8m</td>
</tr>
</tbody>
</table>
## Clinical characterization and management

<table>
<thead>
<tr>
<th>Topic</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe disease: prognostic factors ($218.7m)</td>
<td>701</td>
</tr>
<tr>
<td>Pathophysiology of infection ($567.6m)</td>
<td>1502</td>
</tr>
<tr>
<td>Clinical trial endpoints ($11.3m)</td>
<td>11</td>
</tr>
<tr>
<td>Processes of care ($839.7m)</td>
<td>1099</td>
</tr>
<tr>
<td>Adjuvant therapies ($14.4m)</td>
<td>27</td>
</tr>
<tr>
<td>Core clinical outcomes ($2.1m)</td>
<td>7</td>
</tr>
<tr>
<td>N/A ($51.8m)</td>
<td>255</td>
</tr>
</tbody>
</table>

## Infection prevention and control, including health care workers’ protection

<table>
<thead>
<tr>
<th>Topic</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restriction of movement: effectiveness ($72.0m)</td>
<td>271</td>
</tr>
<tr>
<td>PPE: effectiveness ($74.7m)</td>
<td>413</td>
</tr>
<tr>
<td>Transmission and the environment ($112.6m)</td>
<td>624</td>
</tr>
<tr>
<td>Compliance with IPC interventions ($133.6m)</td>
<td>387</td>
</tr>
<tr>
<td>N/A ($28.2m)</td>
<td>270</td>
</tr>
</tbody>
</table>

## Candidate therapeutics R&D

<table>
<thead>
<tr>
<th>Topic</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>In vitro and vivo testing ($508.0m)</td>
<td>1200</td>
</tr>
<tr>
<td>Prophylactic use ($65.5m)</td>
<td>132</td>
</tr>
<tr>
<td>Supply of therapeutics ($2.0m)</td>
<td>18</td>
</tr>
<tr>
<td>Therapeutics evaluation ($231.3m)</td>
<td>341</td>
</tr>
<tr>
<td>Combination therapies ($11.4m)</td>
<td>54</td>
</tr>
<tr>
<td>N/A ($184.2m)</td>
<td>131</td>
</tr>
<tr>
<td>Candidate vaccines R&amp;D</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Clinical evaluation candidates ($695.5m)</td>
<td>311</td>
</tr>
<tr>
<td>Standardise animal models ($22.6m)</td>
<td>51</td>
</tr>
<tr>
<td>Standardise assays ($20.7m)</td>
<td>39</td>
</tr>
<tr>
<td>Phase 2b/Phase 3 Master Protocol ($31.0m)</td>
<td>7</td>
</tr>
<tr>
<td>Potency assays ($223.3m)</td>
<td>19</td>
</tr>
<tr>
<td>N/A ($1.1b)</td>
<td>233</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ethics considerations for research</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapting existing ethical standards ($17.1m)</td>
<td>65</td>
</tr>
<tr>
<td>Education, access, and capacity building ($4.7m)</td>
<td>16</td>
</tr>
<tr>
<td>Restrictive public health measures: impact ($5.4m)</td>
<td>35</td>
</tr>
<tr>
<td>Public health communications ($9.1m)</td>
<td>79</td>
</tr>
<tr>
<td>Ethical governance of research ($2.8m)</td>
<td>17</td>
</tr>
<tr>
<td>N/A ($6.7m)</td>
<td>34</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social sciences in the outbreak response</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Uptake of public health measures ($344.2m)</td>
<td>1112</td>
</tr>
<tr>
<td>Clinical care and health systems ($61.0m)</td>
<td>277</td>
</tr>
<tr>
<td>Media and communication ($171.5m)</td>
<td>681</td>
</tr>
<tr>
<td>Engagement and participation ($145.0m)</td>
<td>228</td>
</tr>
<tr>
<td>Sexual and reproductive health ($3.6m)</td>
<td>30</td>
</tr>
<tr>
<td>International cooperation ($51.3m)</td>
<td>43</td>
</tr>
<tr>
<td>N/A ($472.2m)</td>
<td>3414</td>
</tr>
</tbody>
</table>

**Notes:**

i. *Individual research projects may be assigned to multiple primary and/or secondary WHO research sub-priority areas.*

ii. *Funding figures available for 61.3% of projects included in the latest version of the tracker database as not all funders provided financial information.*

**Figure 4.** Number of Research Projects Included Under Each Sub-Priority Outlined in WHO Coordinated Global Research Roadmap (known funding amounts indicated in brackets).
‘Candidate Vaccines R&D’ (1), and ‘Social Sciences in the Outbreak Response’ (1). Additionally, the top two sub-priority areas with the largest average of known funding amounts are both from the ‘Candidate Vaccines R&D’ priority area.

At the other end of the spectrum, four of the bottom five sub-priority areas, in terms of the number of projects, are from two priority areas, namely the ‘Animal and environmental research on the virus origin, and management measures at the human-animal interface’ (40th and 41st) and ‘Clinical characterization and management’ (42nd and joint last) areas. In particular, two of these sub-priority areas, ‘Socioeconomic and behavioural risk factors for spill-over’ under the ‘Animal and environmental research priority area (15 projects worth $2.5m), and ‘Develop core clinical outcomes to maximize usability of data across range of trials’ under the ‘Clinical characterization and management’ priority area (7 projects worth $2.1m), also rank among the bottom three in terms of known funding amounts (42nd and 43rd, respectively).

Classification of research projects which did not categorise against WHO Roadmap (emergent categories). There are increasing instances (27.3% of projects on the latest version of the tracker compared to 26.2% previously) where projects can be classified against a priority area but were not deemed relevant to any of the corresponding WHO sub-priority areas. These projects are labelled ‘N/A’ under the relevant priority area and can be seen alongside the sub-priority areas in Figure 4. These projects generally constitute less than one-fifth of either of the overall number of projects and known funding amounts under each of the corresponding priority area.

There are, however, two notable exceptions to this observation. Firstly, under the ‘Candidate Vaccines R&D’ priority area, a substantial proportion of research projects cannot be allocated to any of the WHO sub-priorities. This is the result of the narrow definitions outlined by the WHO for the sub-priority areas under ‘Candidate Vaccines R&D’ which, for instance, do not offer sub-priorities for candidate vaccines not undergoing multi-country clinical trials (62 projects worth $881.3m), vaccine design and administration (33 projects worth $12.4m), or vaccine logistics and supply chains (18 projects worth $23.2m).

Secondly, Figure 4 shows that, under the ‘Social Sciences in the Outbreak Response’ priority area, almost two-thirds of research projects (63.0%) do not align to the WHO Roadmap sub-priorities. This is unsurprising given the tracker collates all research on COVID-19 beyond health, and led us to define the emergent themes in Figure 5.

### Notes:

1. Individual research projects may be assigned to multiple emergent priorities/sub-priorities
2. Funding figures available for 61.3% of projects included in the latest version of the tracker database as not all funders provided financial information

**Figure 5.** Number of research projects classified against emergent research priority and sub-priority areas not previously identified (known funding amounts indicated in brackets).
These highlight important emergent themes for COVID-19 research prioritised by both researchers and funders.

‘Mental health’ is among the two most prominent emergent categories - which does clearly fall within a health remit and it is notable both that this type of research is receiving much attention, but also that currently this is limited to research from a social science perspective, rather than a clinical perspective (and the same can also be said of research addressing ‘digital health’). The further emergent social sciences related sub-priorities of ‘policy and economy’, ‘education’, ‘logistics’ and ‘food security’ and emergent priority of ‘environmental impacts’ are all focussed on the broader social and economic impacts of the COVID-19 recovery and reflect the broader COVID-19 research focus of the tracker and the research consideration of the knock-on effects (health and otherwise).

**Location of projects.** Figure 6 summarises the location where research projects are taking place. Research is being conducted in 157 countries with the greatest number of projects taking place in the United States (3,781 projects) followed by the United Kingdom (3,547) and Canada (1,444).

Of the 16,353 research projects, 567 (3.5%) take place across multiple countries, with research partnerships between Italy and Spain being the most common (36 projects).

Classifying countries by income categories (using the Organisation for Economic Co-operation and Development’s Development Assistance Committee list), the majority of research projects (81.2%) are taking place, at least in part, in high-income countries. With the updated analysis, the proportion of research projects taking place in at least one of the Official Development Assistance (ODA) recipient countries has decreased slightly from 18.4% to 17.8% (2,910 projects). Of these 2,910 projects, just under two-thirds (62.7%) are taking place in at least one upper-middle-income country.

2,702 projects (16.5%) are taking place exclusively in LMICs (previously 17.1%) - with Brazil being the country with the greatest number of projects among these (815), followed by India (303) and Argentina (194). This ordering of countries is largely a result of the present selection of data in the tracker from funders based in these LMICs. Though 93 projects on the latest version of the tracker are taking place in China,
it is acknowledged that there is much more nationally funded research occurring for which data has not yet been obtained. Among the 2,702 projects taking place exclusively in LMICs, 5.6% is being conducted across multiple countries (previously 5.9%).

**Characteristics of research projects in Low- and Middle-Income Countries (ODA-recipient countries).** Most research projects in low- and middle-income countries could be categorised against one or more WHO research priorities. In addition, several were also categorised against the context-specific research priorities identified by the UKCDR, African Academy of Sciences (AAS) and the Global Health Network (TGHN) and are shown in Figure 7 and Figure 8.

Figure 7 shows that some projects mapped to the context specific sub-priorities identified for LMICs under all the nine WHO priorities. The predominant theme was to ‘develop improved diagnostic tools for safer sample collection, faster and easier assays’ whilst research to ‘identify prognostic factors for severe disease’ ranked second. Similarly, a few projects mapped to the new broad priority areas with the highest category being the cross-cutting theme involving the use of technology in various aspects of the pandemic response. Figure 8 shows those projects mapping to existing WHO priorities ‘requiring greater research emphasis in LMICs’. Here most projects mapped to ‘Public health messaging and addressing myths and mistrust’, ‘Trust in public health interventions’ and ‘Understanding infections and outcomes in vulnerable populations’ which might indicate the importance of these research areas in controlling the pandemic in LMICs. In contrast the highlighted priorities involving stakeholder engagement, health systems research, effective PPE use and examining the relationships between repeated viral exposure and diseases severity in frontline healthcare workers were lacking.

Overall, 152 funders have funded research involving LMICs and of these, the Argentinian Ministry of Science, Technology, and Innovation; the National Center for Scientific and Technical Research in Morocco; and Decanato de Pesquisa e Inovação Brazil fund the most projects as shown in Figure 9. Of the funders not based in less-resourced countries UK Research and Innovation (UKRI), International Development Research Centre (IDRC), and ANRS (France REcherche Nord & sud Sida-hiv Hépatites - French Agency for Research on AIDS and Viral Hepatitis) fund the most research projects. Notably, these funders support research across multiple countries with IDRC and ANRS funded projects involving 61 and 26 different countries respectively. Most of the UKRI projects were concentrated in Uganda (where an UKRI MRC centre is located).

The majority of projects funded by Coalition for Epidemic Preparedness Innovations (CEPI) are in HICs with only 3 in China and India. This likely speaks to the availability of the requisite research capacity in HICs for carrying out preclinical and early stages of vaccine research which these projects are primarily concerned with.

**Cross-cutting themes.** During the review and classification process projects were classified against eleven additional characteristics: capacity strengthening; cohorts; gender; implementation; indirect health impacts; innovation; long COVID; modelling; new variants; pandemic preparedness and repurposed grants (descriptions of the types of projects classified against these are provided in the notes for Table 4). Table 4 summarises the distribution of the cross-cutting themes against the WHO Priority Areas.

Looking at the number of projects under each cross-cutting theme (Table 4), the theme of ‘innovation’, is largely driven by the large presence of UKRI data which has a separate ‘innovation’ specific funding stream (985 projects accounting for 67.8% of these projects).

The vast majority of repurposed grants (70.6%) were funded by the National Institutes of Health (NIH) totalling $290.2m. The number of repurposed grants is expected to increase as funders continue to make this data available.

For the cross-cutting theme of ‘capacity strengthening’, more than half of these projects (54.5%) are taking place in at least one LMIC and, among these projects, mostly within the priority area of ‘Social Sciences in the Outbreak Response’ (48 of 85 projects taking place in at least one LMIC) followed by the ‘Virus: natural history, transmission and diagnostics’ priority area (24 of 85 projects).

**Study populations included in projects.** Just under half of the research projects included in the latest version of the tracker deal with human populations (47.4%) with a significant emphasis on populations that have tested positive for COVID-19 (23.1% of research projects studying human populations) as well as population groups defined as vulnerable within the project (18.1% of research projects studying human populations). Figure 10 summarises how the research projects are classified across all levels of the study population categorisation system outlined above.

**UN Research Roadmap for the COVID-19 Recovery**

The total number of included projects relevant to the UN Research Roadmap for the COVID-19 Recovery was 4,942, with a total known funding amount of $915.5 million (previously 4,413 projects worth $309.9 million).

Figure 11. (COVID-19 Research Projects and known funding amounts Classified Against Research Priorities Outlined in UN Research Roadmap) displays the number of projects relevant to each of the five thematic pillars from the UN Research Roadmap and the known funding amounts (as not all funders provided financial information for their awarded research projects). Across the five thematic pillars identified in the UN Research Roadmap, the ‘Social Protection and Basic Services’ pillar had the largest number of associated research projects (2,002) and the second highest known level of funding at $332.0 million (previously 1,821 projects worth $309.9 million).
Figure 7. Research projects in LMICs categorised against their research priorities (LMIC Research Priorities). Shortened forms of the priorities used.
The ‘Health Systems and Services’ pillar ranks second in terms of the total number of research projects (1,518) but had the highest known research funding amount of $454.6 million (previously 1,447 projects worth $444.8 million).

Similarly, when considering the priority areas with the largest known funding amounts, the ‘Health systems and services’ and ‘Social protection and basic services’ pillars each feature three priority areas in the top 10 (according to data on the latest version of the tracker).

The ‘Macroeconomic policies and multilateral collaboration’ pillar has the least number of projects overall – with all five related research priorities among the six lowest funded research areas.

**Trends in Funding Over Time.** To understand the progression of funding for COVID-19 research over time, **Figure 13** summarises the cumulative sum of projects and funding amounts on the tracker according to either the date that the award was made or the publication date of award information.
Known funding amounts indicated in brackets*. 
by funders (as opposed to the date when the details of projects were added to the tracker as there may be a lag between the time that funders publish award information and the time such information is located and subsequently added to the tracker).

Each of the additional 1,575 projects that were added to the tracker since the 15th of January 2022 came from databases that were known to be published prior to January 15th 2022 and are therefore ‘newly captured’, but not newly funded (with the remainder not showing dates of release). More widely, Figure 13 shows a rapid expansion of projects funded over the summer of 2020 – particularly between June and September, with a plateauing of new funding emerging from October 2020 onwards.

Of projects taking place in at least one LMIC, 47.9% came from funder databases published between June and October 2020. The projects in this period were largely funded by LMIC-based funders – most notably the Argentinian Ministry of Science, Technology, and Innovation (with 185 projects); the National Council of Science and Technology of Mexico (132); and Decanato de Pesquisa e Inovação (102).

Discussion

This twenty-one-month update review of the UKCDR and GloPID-R COVID-19 Research Project Tracker has described the huge investment and wide range of research projects repurposed or newly funded related to COVID-19 captured in the tracker between January 15th 2022 to April 15th 2022. It has shown a continued expansion of both funding and capture of funding across the global funding landscape in the tracker, including importantly research taking place within LMICs. The progression of funding has expanded the funding portfolio in the previously well-funded areas, in particular ‘virus natural history, transmission and diagnostics’, ‘candidate
<table>
<thead>
<tr>
<th>Theme</th>
<th>Number of Projects</th>
<th>WHO Priority Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Virus: natural history...</td>
</tr>
<tr>
<td>Indirect Health Impacts ($288.6m)</td>
<td>1799</td>
<td>22</td>
</tr>
<tr>
<td>Innovation ($243.5m)</td>
<td>1452</td>
<td>111</td>
</tr>
<tr>
<td>Modelling ($187.3m)</td>
<td>698</td>
<td>143</td>
</tr>
<tr>
<td>Repurposed ($422.7m)</td>
<td>109</td>
<td>177</td>
</tr>
<tr>
<td>Cohorts ($361.2m)</td>
<td>351</td>
<td>101</td>
</tr>
<tr>
<td>Long COVID ($249.2m)</td>
<td>202</td>
<td>29</td>
</tr>
<tr>
<td>Gender ($32.2m)</td>
<td>186</td>
<td>3</td>
</tr>
<tr>
<td>Capacity Strengthening ($204.2m)</td>
<td>166</td>
<td>39</td>
</tr>
<tr>
<td>Pandemic Preparedness ($157.7m)</td>
<td>148</td>
<td>19</td>
</tr>
<tr>
<td>New Variants ($64.9m)</td>
<td>122</td>
<td>86</td>
</tr>
<tr>
<td>Implementation ($380.0m)</td>
<td>116</td>
<td>18</td>
</tr>
</tbody>
</table>

Notes:
1. Research projects may be assigned with multiple cross-cutting themes and WHO priority areas.
2. Highlighted cells indicate the WHO Priority Area with the greatest number of projects for each cross-cutting theme (excluding projects that were not assigned a priority area, marked N/A).
3. Funding figures available for 61.3% of projects included in the latest version of the tracker database as not all funders provided financial information.
4. Definitions of cross-cutting themes:
   - **Capacity strengthening**: Projects which involve a capacity strengthening component. Capacity strengthening at all levels—individual, institutional and national—is included.
   - **Cohorts**: Projects carried out in newly established cohorts or pivoted existing cohorts for COVID-19 research.
   - **Gender**: Projects which incorporate a gendered lens in description of methods/ objectives and project outputs.
   - **Implementation**: Grants for facilitating research administration.
   - **Indirect Health Impacts**: Projects focusing on indirect health impacts of COVID-19, for example related to disruptions in healthcare services, neonatal, maternal and child health, non-communicable diseases, chronic disease conditions and mental health.
   - **Innovation**: Projects involving novel inventions and interventions.
   - **Long COVID**: Projects involving the long-term morbidity and enduring symptoms of COVID-19 beyond the initial infection.
   - **Modelling**: Projects involving any form of modelling in the methodology.
   - **New Variants**: Projects involving new variants of the coronavirus that cause COVID-19.
   - **Pandemic Preparedness**: Projects with preparedness for future pandemics as an objective.
   - **Repurposed projects**: Pre-COVID research grants (usually for MERS, SARS and other pathogens) where additional funding has been awarded for tailoring to COVID-19 research.
Figure 11. COVID-19 Research Projects Classified Against Pillars Identified in the UN Research Roadmap.

<table>
<thead>
<tr>
<th>Population</th>
<th>Human Population (7,747)</th>
<th>Virus (1,573)</th>
<th>Policy (466)</th>
<th>Animal Population (452)</th>
<th>Literature Review (57)</th>
<th>Other (6,941)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Sub-Population</td>
<td>Adults (2,163)</td>
<td>Children (576)</td>
<td>Adults – Women (319)</td>
<td>Adolescents (204)</td>
<td>Human Pop. - unspec (2,516)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refugees (60)</td>
<td>Domestic Violence Victims (53)</td>
<td>Care Home Patients (42)</td>
<td>LGBQTI+ (28)</td>
<td>Vulnerable Pop. Unsusc. (238)</td>
<td></td>
</tr>
<tr>
<td>Frontline workers-Healthcare workers (559)</td>
<td>Care Home Staff (61)</td>
<td>Nurses (58)</td>
<td>Doctors (26)</td>
<td>Informal (21)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social Care Workers (13)</td>
<td>Paramedics (10)</td>
<td>Healthcare Workers unspec. (549)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frontline workers- Non Healthcare (42)</td>
<td>Volunteers (8)</td>
<td>Food Service (6)</td>
<td>Transport / Shipping (3)</td>
<td>Sanitation (3)</td>
<td>Firefighter (1)</td>
<td>Non healthcare unspec. (256)</td>
</tr>
<tr>
<td>COVID-19 Infection Status (1,961)</td>
<td>Positive (1,791)</td>
<td>Positive – Severe (378)</td>
<td>Negative (348)</td>
<td>Negative – Recovered (234)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 10. COVID-19 Research Projects Classified Using Study Population Categorisation System (number of projects indicated in brackets). Note: Individual research projects may be classified against multiple categories/sub-categories.

1. Individual research projects may be assigned to multiple UN pillars.
2. Funding figures available for 61.3% of projects included in the latest version of the tracker database as not all funders provided financial information.

Figure 11. COVID-19 Research Projects Classified Against Pillars Identified in the UN Research Roadmap.
therapeutics R&D’ and ‘candidate vaccines R&D’ as well as starting to fill some of the previously less funded sub-priority areas, such as ‘supply of therapeutics’ and ethics ‘education, access and capacity building’. The latest iteration has continued to show a clear plateauing of the funding response none of the new funding captured awarded within the most up-to-date three month window.

We are keen for researchers, funders and policy makers to engage with these data directly for their areas of specialism and interest, through extracting the relevant data from the tracker and undertaking their own analyses to aid decision making. Given the time demands on all parties in the pandemic, we hope that the regular provision of these descriptive and thematic analyses provide broad insights to help inform the research community and improve the efficiency and effectiveness of the research response going forwards.

Alignment of the funded research portfolio to the 2020 WHO Roadmap

Importantly, here we have aligned the funded research to the mid- and long-term research and innovation priorities of the

---

Figure 12. Number of Research Projects Included Under Research Priority Areas Outlined in UN Research Roadmap for the COVID-19 Recovery (known funding amounts indicated in brackets).

---

Notes:

i. Individual research projects may be assigned to multiple UNRR priorities

ii. Funding figures available for 61.3% of projects included in the latest version of the tracker database as not all funders provided financial information
WHO Roadmap, and disaggregated the data by locations and population to give a detailed picture of how the research landscape aligns to these global research priorities.

The majority of research funded aligns well to the WHO Roadmap at the priority level, however, low levels of funding in the global research funding portfolio persist, specifically related to the priority areas of ‘Ethics considerations for research’ and ‘Animals and environmental’ and increasingly new areas going beyond the sub-priorities stated in the WHO Roadmap are being researched. Whilst it is not possible to tell from the funded portfolio alone, what is the appropriate level of funding for any priority area, we believe that ‘Animals and Environmental’ does still represent important and real research gaps, towards which the research community should be shifting its attention. It is also important to note the intention and detail of these and all priority areas within the WHO Roadmap, where there is variability in who is best positioned to address the research sub-priorities with some clearly needing external research activity and others indicating research activity which the WHO planned to undertake directly themselves.

The lack of alignment of funded research projects to the ‘Ethics considerations for research’ priority may be one such example, as it misses the direct activity that the WHO has undertaken in to address this priority through direct research and provision of important guidance on ethical matters relating to COVID-19 which align to the sub-priorities as well as the clear strength of ethical consideration across many research projects (which don’t necessarily have a core focus on ethics). Despite these considerations, both researchers and research funders need to pay greater attention to the prominence placed on ethical considerations for research by the WHO and ensure that further research is undertaken on those aspects outlined under the roadmap priority area explicitly for standalone ethics research (which we note have continued to expand in this iteration).

For ‘Animals and environmental research’, again the WHO has undertaken direct activity in this regard (including their mission with China), and through a recent scientific publication on the origins of COVID-19. However, except for a few notable projects in LMICs, the instigation of necessary broader research activity in this area, particularly looking towards gaining broader understanding of how such viruses emerge in the human population and proactive surveillance is certainly limited and needs to be expanded and longer term in nature. This research needs to be undertaken in locations where diseases are most likely to emerge, due to the nature of interactions between humans and animals, many of which are LMICs and this

Figure 13. Cumulative number of projects and known funding amounts by month of funder database release.

Notes:

i. Funding figures available for 61.3% of projects included in the latest version of the tracker database as not all funders provided financial information.

ii. Precise dates of database release available for 14,756 projects on tracker (90.2%)
could therefore play an increasingly important role in the research portfolios in these locations going forward. It is also important that this research activity for this priority expands beyond the remit of the WHO and through collaborations with the UN Food and Agriculture Organisation (FAO) and the World Organisation for Animal Health (OIE) through a One Health framework and the newly ‘international expert panel to address the emergence and spread of zoonotic diseases’ is a further step towards this

Beyond the clear gaps at the priority level, it is inherently difficult to conclude when a particular priority area has received sufficient research funding or research projects at the grant award stage, as this is only apparent when the outcomes are achieved and it is clear that the research question has been sufficiently answered. We do however further note, that within some of the better funded WHO research priority areas, there are still certain sub-priorities which again are clear gaps. This is the case for ‘Optimal endpoints for clinical trials’ and ‘Develop core clinical outcomes to maximize usability of data across range of trials’ within the ‘Clinical characterisation and management’ priority area. This may well result from the fact that these activities will be implicit but not explicit in clinical research projects; however, this in itself may indicate a clear issue where both these sub-priorities are essential for collation of results across studies and should therefore be explicit, pointing to the generally observed lack of coordination beyond a few pre-established clinical trial networks as highlighted in discussions at the GloPID-R Synergies Meetings. In contrast, the variability of research activity indicated within the ‘Candidate therapeutics R&D’ priority area appears to reflect the inter-dependencies of these sub-priorities rather than necessarily a gap needing immediate funding, with research into ‘Supply of therapeutics’ depending to some extent on the identification of particular safe and effective therapeutics.

For those sub-priorities where research investments have been focused there will continue to be benefits to enhanced coordination. We have already highlighted the wide range of social science research projects addressing ‘Uptake of public health measures’ and ‘Media & communication’ sub-priorities to the WHO COVID-19 Social Sciences working group. The basic virus research on ‘Diagnostic products’, ‘Virus compartment shedding and history’ and ‘Characterising immunity’ are further areas where coordination should be explored globally due to large funded research portfolios. Many of these basic virus research projects are explicitly linked to the early stages of candidate therapeutic, vaccine and diagnostic design, and as results have become available from late-stage trials on the effectiveness of various classes of these and they are being rolled out; there is a need to refine the focus of the pipeline research more strategically to both target remaining gaps and build on emerging successes.

Location of research
The majority of the funded research projects in the tracker are located in HICs, reflecting national funding by some of the wealthiest research funders, with the truly global nature of the pandemic meaning that virus was circulating in these countries to enable relevant clinical research. A large amount of research has also been funded within China, although as explained in the limitations we have not managed to incorporate this. The global distribution of funding is now shifted slightly, with more funding calls and announcements related to LMICs and some domestic funding captured (e.g. in Brazil). There appears to have been growing recognition that context specific research is needed in LMICs, although the results presented here show only small proportional expansion of funding dedicated to context specific research priorities with an important focus on faster and easier diagnostic tools and identifying prognostic factors of severe COVID-19 infections. There remain clear research gaps relating to health systems, optimal personal protective equipment use, health care worker support, community engagement, disease severity studies and effective public health interventions in various settings. We published a separate detailed sub-analysis of the baseline tracker data relating to COVID-19 research in Africa, in collaboration with the African Academy of Sciences.

Research populations
The disaggregation of research projects by populations is particularly insightful with regards to the ‘Social Sciences’ WHO Roadmap priority, but also for the ‘Clinical management’ and ‘Epidemiological studies’ priority areas. A range of vulnerable populations appear to be well represented for the social sciences including ‘minority populations’. A range of health care worker populations and other frontline workers are also included in research funded which again is important due to the clear evidence on greater risks of exposure to individuals in certain occupations in this pandemic. Children are well represented in the epidemiological studies in accordance with the prioritisation of understanding their role in transmission but underrepresented in the studies on long COVID. The disaggregation of research by different populations can be particularly useful to policy makers and to ensuring research activity engages the necessary range of populations.

Beyond the 2020 WHO Roadmap
Given the funded research projects within the tracker relate to disciplines beyond health (with relevance to COVID-19) it is unsurprising that several important emergent research themes identified relating to broader vaccine research and social sciences disciplines (policy and economy; education; logistics and food security) and also environmental research, extend beyond the priorities included in the WHO Roadmap Priorities. These represent important areas for COVID-19 research which funders and researchers are already prioritising with research projects. The two emergent themes of mental health and digital health are however directly relevant to the health research remit and appear to have not been sufficiently covered in the WHO Roadmap document, although projects on these are being funded. The emerging category of research on long COVID, was not evident or anticipated as a research need at the time of development of the WHO Roadmap (although it should now inform the need for prioritisation of research including long-term follow up of cases for any newly emerging disease). These shifting priorities emphasise the need for
living’ research priority roadmaps, given the original roadmap was developed over two years ago at the outset of the pandemic.

We may also be observing the evolution of research priorities from response to recovery and expect to see further examples of this. The expansion of COVID-19 research beyond the original WHO Roadmap document illustrates the wide-reaching social, economic and cultural impacts of the pandemic. We have for the fourth time in this iteration mapped the funded research portfolio against the UN Research Roadmap for the COVID-19 Recovery which identifies 25 research priorities across five pillars (health systems and services, social protection and basic services, economic response and recovery, macroeconomic policies and multilateral collaboration and social cohesion and community resilience). This has helped to categorise the many social sciences projects which fall outside the remit of the WHO roadmap and provides an initial assessment of the funded research portfolio against these UN identified priorities. The results indicate a large proportion of the funded research projects (30.2%) have relevance to the COVID-19 recovery agenda, however at the research priority level the notable absence of projects addressing ‘macroeconomic policies and multilateral collaboration’ may indicate an important gap.

A key strength of this tracker is its breadth and we have therefore undertaken some initial cross-cutting thematic analyses across it here to highlight additional variables that cross-cut disciplines with the inclusion of capacity strengthening, innovation, repurposed grants, modelling, cohorts, pandemic preparedness, implementation, indirect health impact, gender, long covid and new variants. The analyses on these themes are given greater focus in ‘tracker highlight’ analyses released on the tracker website.

Conclusion
In conclusion, we have here provided a detailed review and thematic analysis across the COVID-19 funded research available and we now encourage the research community to use this and the tracker tool to support informed decision making on further research prioritisation, based on the knowledge of what research is already initiated. We encourage research funders to continue to submit their data to the tracker to ensure it can be as effective as possible.

The global research response has aligned well to the WHO Roadmap, however clear research gaps appear to remain in the portfolio relating to ‘Animals and environmental’ priority areas as well as research taking place in and relating to priorities of relevance to LMICs. Research relating to diagnostics, therapeutics and vaccines (from basic research onwards) have now all received substantial investment, across a huge number of different studies around the world. Initial tracking also indicates robust alignment between the global research investments and research priorities identified in the UN Research Roadmap for the COVID Recovery with investments focused on health systems, social protection and social cohesion and community resilience. Research to better understand the role of macroeconomic policies and multilateral collaboration for social and economic recovery from COVID-19 is a notable gap.

To ensure the research investments yield impact, there is now need for enhanced coordination and reprioritisation (taking stock of achievements and defining whether original priorities are still valid over two years on). This is particularly important now that the initial flourish of research funding for COVID-19 appears to be plateauing and research priorities evolving.

We have also shown here the power of tracking research funding at source in real-time, which is particularly important in the fast-moving research environment created by a pandemic, but may have benefits for other global collaborative research efforts going forward. The challenge of nationally funded projects that are underpowered and therefore unable to achieve their aims, demands that researchers and funders be much more strategic going forwards to efficiently and effectively advance knowledge within epidemics and pandemics. Tools such as this tracker can facilitate global collaboration and solidarity to maximise the efficiency and impact of research funding.

Limitations of findings and challenges
To the best of our knowledge we have compiled the most comprehensive database of funded COVID-19 research. We are however very mindful of its inherent limitations and the difficulties in gaining a fully comprehensive picture in what is a truly global research effort to a global pandemic. One main limitation is the absence of commercial research data making inferences on gaps in the vaccine and therapeutics portfolios difficult (this is lacking due to associated intellectual property restrictions). This tracker however has rich data on the early stage development research for those same priorities which is valuable for public funder coordination efforts and enables thematic analyses across disciplines. Another limitation is the fact that few funders to date have shared data on repurposed grants or grants for institutional funding which may have been used for COVID-19 related research.

We are also aware of several funders across wider geographies and disciplines, from whom we have not yet been able to incorporate data. We call here for further research funders (especially within LMICs) to continue to submit their data to make this tracker and associated analyses more accurate to improve the ongoing coordination and help focus limited resources.

The alignment of research in this tracker to the priorities outlined in the WHO Roadmap also has its challenges, given the Roadmap was produced at speed by drawing together findings from different working groups operating in different ways. The resulting priorities are unsurprisingly imbalanced with some covering much broader research areas than others and with not all sub-priorities intended to be addressed by newly funded research. We have tried to account for this in the discussion of the results here. Another limitation of these priorities and indeed any priorities in a pandemic is their limited temporal nature. The WHO Roadmap priorities that we have mapped here, although named mid- to long-term priorities, were identified by world experts in February 2020, at a time when the majority of cases of COVID-19 were still in China and a pandemic had not yet been declared.
Sustainability and future work
This living mapping review will be updated on a quarterly basis for the duration of the COVID CIRCLE initiative. Future planned work includes incorporation of any new priorities or sub-priorities from any revision of the WHO Roadmap. Given the tracker contains a broad range of research relating to COVID-19 (beyond health research) and the evolution towards longer term thinking around research priorities, we will also continue to code to the UN Research Roadmap for the COVID Recovery6 in collaboration with the team who developed it.

Data availability
Underlying data
The continuously updated data related to this study are openly available in the COVID 19 Research Project Tracker by UKCDR & GloPID-R at https://www.ukcdr.org.uk/funding-landscape/covid-19-research-project-tracker/.

Replication Data for: ‘A living mapping review for COVID-19 funded research projects: 21 month update’
https://doi.org/10.7910/DVN/RDAN9Z, Harvard Dataverse, V1

Extended data

This project contains the following extended data:
• 20220831 - Figure 1 (PRISMA Flow).docx
• 20220831 Extended data 2 Data sources.docx
• 20220831 - Figures (3, 6, 10,11) and table 4.pptx
• 20220831 Figures (2, 4, 5, 12, 13).docx
• Figure 7, 8 & 9.docx
• Ext data 1 COVID19 Research Project Tracker_Template_ Norton et al August 2020.xlsx
• Ext data 3 WHO priorities.docx
• Ext data 4 African and LMIC research priorities.docx

Reporting guidelines

Data are available under the terms of the Creative Commons Zero “No rights reserved” data waiver (CC0 1.0 Public domain dedication).

Acknowledgements
We would like to thank all funders who have provided data to the tracker to date. We also thank all our collaborators who were authors in previous iterations of this review and have now moved on including Nicole Advani, Cathryn Johnston, Sheila Mburu, Emma Clegg, Marguerite Gollish, Sara Sahota, Laura Scott, Gail Carson and Marta Tufet Bayona. We also thank the Infectious Diseases Data Observatory (IDDO) for inspiring us to undertake this analysis as a living review, through their living systematic review of COVID-19 clinical trial registrations86.

References


Open Peer Review

Current Peer Review Status: ✓ ✓

Version 6

Reviewer Report 29 July 2022

https://doi.org/10.21956/wellcomeopenres.19909.r51745

© 2022 Vaughn D. This is an open access peer review report distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

David Vaughn
Bill and Melinda Gates Foundation, Seattle, WA, USA

No additional comments.

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 5

Reviewer Report 22 March 2022

https://doi.org/10.21956/wellcomeopenres.19586.r49399

© 2022 Vaughn D. This is an open access peer review report distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

David Vaughn
Bill and Melinda Gates Foundation, Seattle, WA, USA

No new comments.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Vaccine development.
I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 4

Reviewer Report 01 July 2021

https://doi.org/10.21956/wellcomeopenres.18739.r44742

© 2021 Vaughn D. This is an open access peer review report distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

David Vaughn
Bill and Melinda Gates Foundation, Seattle, WA, USA

No further comments.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Vaccine development.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 3

Reviewer Report 01 April 2021

https://doi.org/10.21956/wellcomeopenres.18438.r43370

© 2021 Vaughn D. This is an open access peer review report distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

David Vaughn
Bill and Melinda Gates Foundation, Seattle, WA, USA

No further comments.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Vaccine development.
I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 2

Reviewer Report 21 December 2020

https://doi.org/10.21956/wellcomeopenres.18093.r41885

© 2020 Smith P. This is an open access peer review report distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peter Smith
MRC Tropical Epidemiology Group, London School of Hygiene and Tropical Medicine, London, UK

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 21 October 2020

https://doi.org/10.21956/wellcomeopenres.17862.r40581

© 2020 Smith P. This is an open access peer review report distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peter Smith
MRC Tropical Epidemiology Group, London School of Hygiene and Tropical Medicine, London, UK

This assembly of the database on which this “systematic review” is based clearly represents a major effort. The database is likely to be most useful to funders, who will wish to avoid supporting research that is unnecessarily duplicative and it will also be of value to researchers seeking to identify others who are working in a similar area or to identify research areas that seem to have been relatively neglected. The authors have gathered data on research supported by 25 funders, mostly based in high income countries. How complete this is, even for these funders is difficult to judge, but based on the projects supported by each funder, there seems to be a strong bias towards UK funders. It is surprising, for example, to see the US NIH having supported less than
25% of the number supported by UKRI. A notable deficiency in the database, acknowledged by the authors, is the lack of data from China, where there has been substantial research on SARS-CoV-2, and LMICs in general (e.g. Brazil, India). However, it is understandable that there are challenges in accessing comprehensive information from these sources. Another challenge is that most, but not all, of the information presented relates to the number of projects supported rather than the magnitude of the support. The database is also missing information from private companies, including pharma companies, where much research on vaccines, therapeutics and diagnostics is likely to be supported. It is also unclear whether the databases of registered clinical trials have been trawled to identify ongoing research. For these reasons, I am not convinced that it is appropriate to label the paper as a systematic review as it seems to be a review only of what has been accumulated in the database to date.

I recognize that the database is early in its life, but as an ongoing check on completeness it may be useful, in the future, to link published papers on SARS-CoV-2 to the database to see what is not being picked up in the database, acknowledging that it is not infrequently difficult to link a particular paper to a particular research grant.

In the review, projects in the database are linked to WHO Blueprint list of research priorities defined in February 2020. This helps identify areas where there are possible funding gaps. However, there are some limitations in using the data base for this purpose. For example, the authors note that there are clear gaps in support for 'optimal endpoints for clinical trials and core clinical outcomes' and on 'ethical considerations for research'. Both of these areas have had considerable attention, the former in the context of treatment and vaccine trials (the authors acknowledge the problems in identifying research that may be embedded in other research undertakings) and much of the ethical work that has been done has not required specific funding.

Despite some of the deficiencies identified above, the generation of the database has been a valuable undertaking, and as more funders come on board it will become even more useful. Similarly, the ongoing systematic review will give a useful summary of what is in the database and will help identifying trends in funding and areas where support has been lacking.

**Are the rationale for, and objectives of, the Systematic Review clearly stated?**  
Yes

**Are sufficient details of the methods and analysis provided to allow replication by others?**  
Yes

**Is the statistical analysis and its interpretation appropriate?**  
Not applicable

**Are the conclusions drawn adequately supported by the results presented in the review?**  
Yes

**Competing Interests:** No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.
Author Response 30 Nov 2020

Alice Norton, UK Collaborative on Development Research, London, UK

Thank you very much for your helpful comments on our Baseline paper, we are pleased that you believe that this has been a valuable undertaking. We have now updated the review with the latest data in the tracker up to the 15th October and have also taken that opportunity to address some of your comments within the new version of the paper. This continues (in our view) to be the most comprehensive data set on research funded on COVID-19 with now over five thousand projects from 72 funders (all categorised to the WHO R&D Blueprint). We have now provided further details relating to magnitude of funding commitment in addition to numbers of projects in the figures relating to funders and agree that this helps with interpretation. We have noted and agree with the limitations that you highlight regarding the challenges in accessing the full breadth of global research data in this field and we have already clearly acknowledged these limitations. We also agree that the ‘systematic’ terminology may not therefore be fully appropriate for this endeavour and have now instead re-categorised this as a living mapping review. We also agree with your points on the particular sub-priorities in the roadmap which may have received attention outside of newly funded or even repurposed grants, and we have further clarified our discussion of these. We are continuing to expand the global representation of funders in the database and are exploring connections with both clinical trial registrations and outputs (although neither of these are straightforward). We hope that you find this latest version of the paper of renewed interest and relevance.

Competing Interests: No competing interests were disclosed.

Reviewer Report 21 September 2020

https://doi.org/10.21956/wellcomeopenres.17862.r40348

© 2020 Vaughn D. This is an open access peer review report distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

David Vaughn
Bill and Melinda Gates Foundation, Seattle, WA, USA

This is a well-written report by the UKCDR and GloPID-R on their living systematic review (Project Tracker) of COVID-19 R&D including 1858 projects supported by 25 funders across 102 countries as of 15 July 2020 aligning said R&D efforts with the WHO global research roadmap for COVID-19 R&D published in March 2020. The tracker also identifies research objectives not included in the WHO roadmap (seven new areas) that may influence planning for future pandemics (including future WHO roadmaps). A spin-off of the effort (COVID CIRCLE) focuses on R&D in resource-limited settings.

The Tracker allows the global health community to assess the COVID-19 research portfolio to
identify gaps (Animal and environmental research? Clinical trial endpoints and outcomes?) and to reduce duplication (more than 300 vaccines being advanced?); reduction of excessive duplication is important given limited global R&D resources.

The authors are transparent concerning the limitations of the effort. The data is skewed to GloPID-R members. It is heavily UKRI biased. The US NIH, in particular, seems under-represented. Repurposed funded research may be missed. There is limited data from a number of governments (e.g., China as noted by authors) and private sources (e.g., companies, private foundations such as the BMGF, and ethics think tanks). This publication may encourage more LMICs to participate in the accounting.

Is it possible to comment on measured or perceived impacts? Who uses? Is there documentation of times accessed? Is it timely information if the figures are updated only every three months? The group should conduct a survey at the end of the calendar year to see if funders changed direction based upon this effort. Has there been a reduction of duplication? Or, will this be a retrospective of what happened with little real-time impact on what was happening? Shifting of funding to LMICs is one positive example of impact. Again, we will need a later assessment to build upon this baseline review focusing on impact on the pandemic response. Has the scope been too broad?

**Are the rationale for, and objectives of, the Systematic Review clearly stated?**
Yes

**Are sufficient details of the methods and analysis provided to allow replication by others?**
Yes

**Is the statistical analysis and its interpretation appropriate?**
Not applicable

**Are the conclusions drawn adequately supported by the results presented in the review?**
Yes

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** Vaccine development.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

---

**Author Response 30 Nov 2020**

Alice Norton, UK Collaborative on Development Research, London, UK

Thank you very much for your very helpful comments on our baseline paper. We are delighted to now provide a three-month update paper in which the number of projects and funders has greatly expanded over the interval (to over 5 thousand projects from 72 funders). We aim to continue to achieve further geographical cover through ongoing efforts to raise the profile of the tracker and source data from further funders. Thank you for your suggestion regarding inclusion of data on use of these data and perceived impact, we have
now included reference to this in this three-month update. We will also be undertaking a retrospective consultation on the influence of this work as part of the learning element of COVID CIRCLE in early 2021. We hope that you find this latest version of the paper of renewed interest and relevance and we would also like to highlight the more frequent updates and highlights available on the funding tracker website.

**Competing Interests:** No competing interests were disclosed.