COVID-19 FUNDED RESEARCH PROJECTS IN FOCUS:
New Variants

Key findings:

Number of projects:

132

Funding investments (known funding amounts):

$67.3m

Top funder:

NIH

New Variants

Introduction

To date, the world has seen more than 650 million known cases of COVID-19 and the pandemic has claimed over 6.6 million lives [1]. All viruses, including SARS-CoV-2 (which caused COVID-19), adapt over time. Some of these changes can affect the properties of a virus, including how easily it spreads, the severity of disease, effectiveness of vaccines, therapeutics and diagnostic tools, and other public health/social measures [2].

The evolution of SARS-CoV-2 was monitored by experts as of January 2020, and later in the year specific Variants of Interest (VOIs) and Variants of Concern (VOCs) were characterised, as the emergence of variants posed an increased risk to public health worldwide. Identified VOCs include: Alpha, Beta, Gamma, Delta and Omicron. Omicron is the only VOC still circulating according to WHO [2].

Here, we present the scope of funded research activity focussed on identified or potential variants of COVID-19, drawing on evidence from the January 2023 update of the Living Mapping Review (LMR) of COVID-19 funded research projects and the UKCDR/GLOPID-R COVID-19 Research Project Tracker.

Methodology

Descriptive and thematic analyses were conducted as outlined in the LMR study protocol. Projects with some degree of focus on variants of COVID-19 were identified and coded as such. The identified projects include those investigating factors such as the natural history of the disease, phenotypic change and adaptation of COVID-19, adaptive immunity, and the related implications for vaccine effectiveness, and how to respond to variants of concern for COVID-19. As part of the analysis the following were determined: key funders; funding amounts; country distribution of projects; specific research focus; and study populations.

Findings

Locations, funders and funding amounts

The 132 projects identified as having an identifiable focus on new variants of COVID-19 were funded by 31 funders with an investment of at least $67.3m. The National institute for Health (NIH) funded the most projects (32), closely followed by the Canadian Institute for Health Research (CIHR) with 28 projects (contributing to 45% of the total number of projects between them). The third highest was UK Research and Innovation (UKRI) with 12 projects (see Table 1). UKRI invested $19.4M in projects that investigated new variants, followed closely by CIHR ($17.8M) and NIH ($17.4M) (see Figure 1).

Table 1: Top 10 Funders of COVID-19 variants research by known value of projects on tracker (number of projects indicated in brackets)
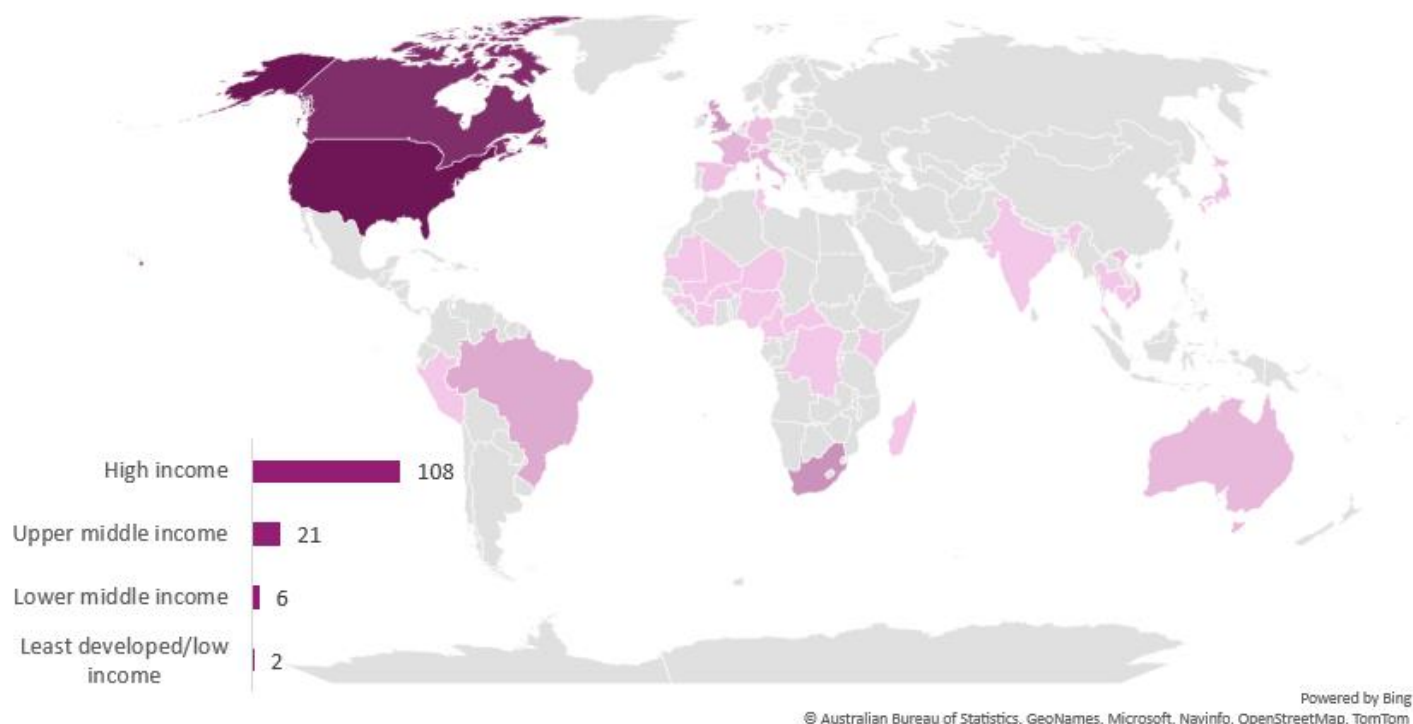
Top 10 funders (number of projects)	Number of projects
NIH	32
CIHR	28
UKRI	12
Department of Science and Innovation - South Africa	6
FAPESP	5
South African Medical Research Council	5
European Commission	4
NHMRC	4
Agence nationale de la recherche (ANR)	3
Michael Smith Foundation	3
Genome BC	3
SNSF	3
NSF (USA)	3

Figure 1: Research funders investing in COVID-19 variants research: amount invested (USD), with number of projects shown in brackets
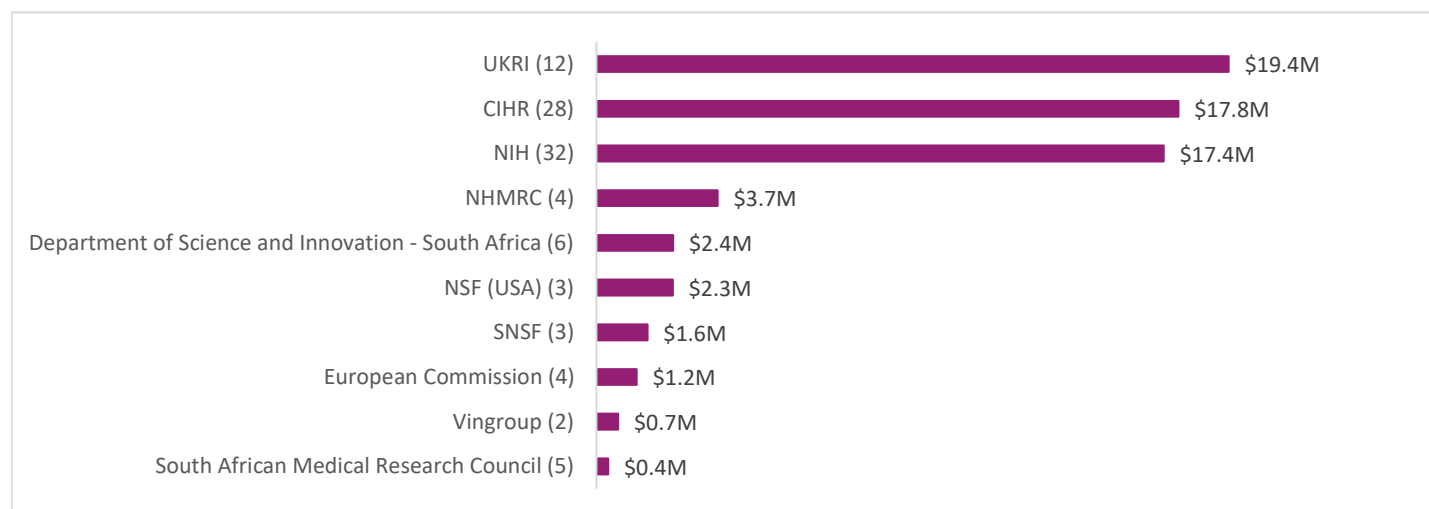
Research involved 38 countries. However, only 27 projects involved at least one low- or middle-income country (LMIC) (and only two projects involved at least one least-developed country), whereas 108 took place in at least one high-income country (HIC) as shown in Figure 2. USA was included in 37 projects, the highest number across countries, closely followed by Canada (32). The next highest was South Africa (12).

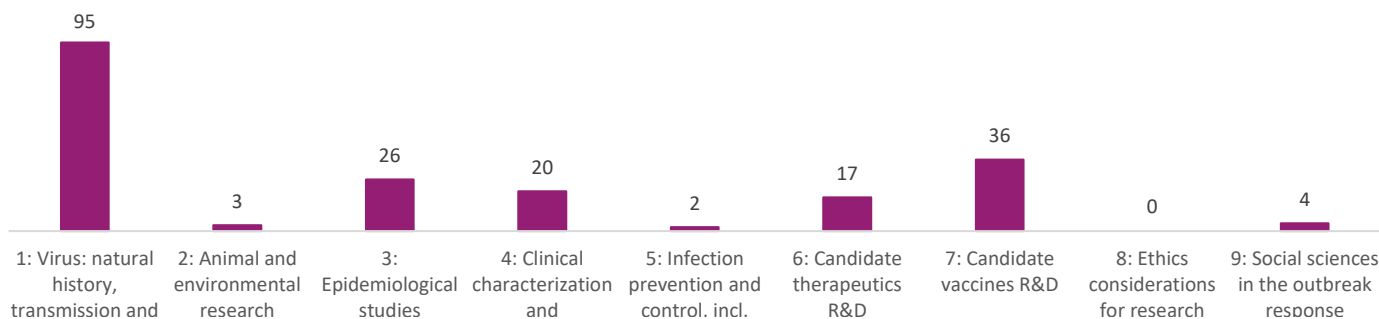Figure 2: Locations of projects investigating COVID-19 variants

High income — 108
Upper middle income — 21
Lower middle income — 6
Least developed/low income — 2

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Research focus and WHO research priorities

The majority of "new variant" projects were coded against the priority area of 'Virus: natural history, transmission and diagnostics' (95 projects). This would be expected due to the nature of the topic, which concerns knowledge about the virus and how it adapts, and the implications for vaccines and therapeutics. The next highest priority areas covered were: 'Candidate vaccines research and development' (36 projects), 'Epidemiological studies' (26) and 'Clinical characterization and management' (20) (see Figure 3).

When analysing the projects further, the five sub-priority areas of most interest were:

- 1c: Development of tools and conduct studies to monitor phenotypic change and potential adaptation (53 projects);
- 1d: Characterization of immunity (39);
- 1b: Understanding virus compartments, shedding and natural history of disease (20);
- 4b: Understand pathophysiology of COVID-19 infection (17);
- 6a: In-vitro and in-vivo testing to identify therapeutic candidates (15)

Figure 3: COVID-19 variants research projects categorised by WHO

95 — 1: Virus: natural history, transmission and
3 — 2: Animal and environmental research
26 — 3: Epidemiological studies
20 — 4: Clinical characterization and
2 — 5: Infection prevention and control. incl.
17 — 6: Candidate therapeutics R&D
36 — 7: Candidate vaccines R&D
0 — 8: Ethics considerations for research
4 — 9: Social sciences in the outbreak response

Study populations

67 of the projects in this analysis were conducted with the human population. Of those involving human subjects, the focus was the virus's natural history, transmission and diagnostics (47 projects) and/or vaccines research and development (23 projects). 54 projects studied the virus itself (49 the virus's natural history, transmission and diagnostics, and 9 vaccines). And 16 studies specified research with animal populations, which focused on factors including transmission, pathogenesis, immune escape and implications for vaccines. (Figure 4 shows more details on this.)

Figure 4: COVID-19 variants research projects classified using the study population categorisation system
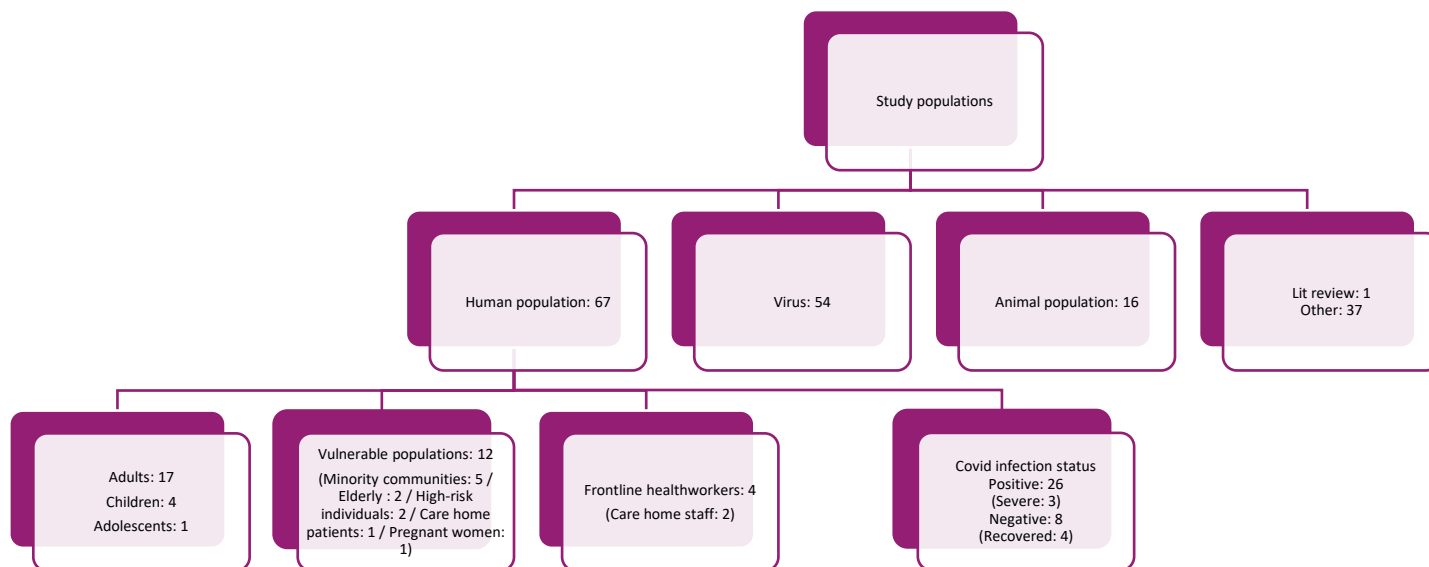
Discussion and conclusion

This tracker highlight is the fourth iteration focusing on new variants and the number of known projects investigating new variants is still relatively low compared to other areas of interest. As more data is acquired from funders and coded as part of the team's coding process, more projects are expected to be recognised as being in this area; there has been an increase in projects in both subsequent iterations of this highlight. It is also likely that much of this research may be being undertaken within existing COVID funded projects.

Despite the relatively small sample set, it is still important to highlight that research projects in this area were concentrated in HICs and upper-middle income countries. Only 7 projects took place in a lower-middle or low-income country (5.3%). This is an important gap to highlight, as it is people in the world's poorest countries who continue to be most affected by COVID-19 [3] and several variants of COVID-19 were identified in lower- and middle-income countries first, including Delta (India), Omicron and Beta (South Africa), and Gamma (Brazil) [2, 5].

The world's poorest countries are the least likely to have good vaccination coverage, which means they are more vulnerable to severe illness *and* variations of the virus. Scientists have warned this in the past [6], yet vaccine coverage remains an issue. Whereas more than two-thirds of the world population have received at least one dose of a COVID-19 vaccine, this is the case for only 23 percent of people in low-income countries [7]. If vaccination coverage stays so unequal, it will be of high importance to develop and build the research body investigating COVID-19 variants to include more of these low-income countries.

As new variants continue to be a problem at a global scale, it will be important for further research to be undertaken in this field.

About the UKCDR/GloPID-R Tracker

The UKCDR/GLOPID-R COVID-19 Research Project Tracker (the Tracker) is a live open access database which categorises COVID-19 research activity funded around the world against the WHO research priorities outlined in the WHO Coordinated Research Roadmap. COVID CIRCLE has initiated a Living Mapping Review of these projects, published in Wellcome Open Research, to support funders and researchers in the achievement of a coherent response to this pandemic.

For more on the Tracker and our work on COVID-19, visit: ukcdr.org.uk/covid-circle This piece was developed by Chantel Jones, Adrian Bucher & Alice Norton.

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Notes

Limitations of data and findings: Study protocol is outlined in Living Mapping Review of COVID-19 funded research projects. Analysis was limited by:

- A lack of completeness of funding and/or qualitative data for some projects.
- Tracker data is more likely to be derived from UKCDR and/or GloPID-R funders.
- The absence of commercial research.

References

[1] World Health Organisation, WHO Coronavirus (COVID-19) Dashboard. [online] Available at: <https://covid19.who.int/> [Accessed 9 January 2023].

[2] World Health Organisation, Tracking SARS-CoV-2 variants. [online] Available at: <https://www.who.int/en/activities/tracking-SARS-CoV-2-variants/> [Accessed 25 October 2022].

[3] World Bank Blogs (2021) COVID-19 is hitting poor countries the hardest. Here's how World Bank's IDA is stepping up support. [online] Available at: <https://blogs.worldbank.org/voices/covid-19-hitting-poor-countries-hardest-heres-how-world-banks-ida-stepping-support> [Accessed 13 April 2022].

[5] World Health Organisation (2021) Classification of Omicron (B.1.1.529): SARS-CoV-2 Variant of Concern. [online] Available at: <https://www.who.int/news/item/26-11-2021-classification-of-omicron-(b.1.1.529)-sars-cov-2-variant-of-concern> [Accessed 20 April 2022].

[6]: Grover, N. (2021) Covid: new vaccines needed globally within a year, say scientists. [online] Available at: <https://www.theguardian.com/world/2021/mar/30/new-covid-vaccines-needed-within-year-say-scientists> [Accessed 13 April 2022].