

SIDEBAR

COVID-19 and Academic R&D

When the COVID-19 pandemic struck the United States in March 2020, it disrupted R&D performed by colleges and universities. The need for social distancing led to laboratory closures, curtailment of projects, and resource allocation shifts (Morgan and Sargent 2020). While most research activities have resumed as of the spring of 2021, lingering effects continue, and the pandemic's long-term implications for the U.S. academic R&D enterprise remain unclear.

Due to time lags between data collection and availability, the surveys used in this report do not yet provide information on the impact of COVID-19 on academic R&D. Other sources, however, offer an understanding of aspects of COVID-19's effects to date on research activities, institutions, and researchers themselves. Moreover, many of these sources reveal that impacts have been unequally distributed. This sidebar briefly addresses impacts of COVID-19 on academic R&D; additional impacts on S&E higher education, publication patterns (Vigliano 2020; Vincent-Lamarre, Sugimoto, Larivière 2020), and the overall research enterprise will be addressed in other *Indicators* thematic reports.

Estimated effects on research

The pandemic shut down significant portions of university research operations (Walsh 2020; Wigginton et al. 2020). The immediate impacts of these shutdowns on research projects varied between project types and fields of study due to the nature of the work performed (Servick et al. 2020; Upadhaya et al. 2020). Some research, deemed essential, was not shut down at all (Gewin 2020a). Aggregated data from 10 major research universities indicate a large drop-off in spending from research grants between March and May 2020 (IRIS 2020). Guidance that allowed researcher salaries to be paid while research was slowed or suspended may have lingering effects on research project timelines and future funding.

When researchers began returning to labs, they did so with new restrictions to prevent transmission of the virus. This has led to a continuing state of reduced productivity (Korbel and Stegle 2020; Muzzio 2020; Walsh 2020), which one group has termed the "pandemic normal" (COGR 2020), estimating large research output losses and financial and economic impacts since the start of the pandemic (COGR 2021).

Estimated effects on institutions

While only part of its overall effects on higher education institutions, the pandemic introduced new costs related to R&D. Shutdown and ramp-up activities required time and money. Personal protective equipment, testing, and lost staff time continue to exact costs (Mayer 2020). Research universities began using their own funds to support core facilities and shared instrumentation normally supported by fees paid from grants (Walsh 2020). Institutions continue working to understand and quantify these costs (APLU et al. 2020; COGR 2021; Keane 2021).

Some institutions were able to reboot laboratories and research faster than others. For example, Purdue University, a flagship land-grant university in Indiana, was able to restart more than 95% of its campus research spaces and core labs under modified COVID-19 operation by the end of June 2020 (Mayer 2020). In contrast, at Oakland University, a regional public university in Michigan, only around half of research labs had resumed work by early September 2020 (Stone 2020). Part of the difficulties faced by smaller institutions, including many minority-serving institutions, was their reliance on undergraduate students, rather than graduate students and postdocs, in the R&D enterprise (Stone 2020; see also Sloan et al. 2020).

Estimated effects on researchers

Myers et al. (2020) surveyed young principal investigators about how much the COVID-19 pandemic had reduced the time they spend on research. Results varied by researchers' sex, field, and whether they had dependents, with particularly large declines in female researchers (Deryugina, Shurchkov, and Stearns 2021), those with young children, and those in "bench sciences" (Myers et al. 2020; see also Gewin 2020b; Giurge et al. 2020; Woolston 2020a).

The research and career plans for many graduate students (Muzzio 2020) and postdocs (Woolston 2020c) were altered. For example, many doctoral students' timelines for completing their degrees have been extended (Levine 2021), and the availability of faculty positions has declined (Langin 2020). Undergraduates faced difficulties obtaining research experience, with potentially detrimental effects on their abilities to finish their degrees and, over the longer term, whether they pursue S&E careers (Stone 2020). These populations exhibited increased anxiety and mental illness (Ro 2020; Woolston 2020b) as revealed partially through experience surveys and focus groups (Chirikov et al. 2020; CMU 2020; Levine et al. 2021; Ogilvie et al. 2020; University of California, Berkeley 2021).

International students and postdocs, many of whom participate in research, faced additional difficulties including travel and visa restrictions, housing limitations, and funding (Martel 2020a, 2020b). Recent estimates indicate that international students at U.S. higher education institutions decreased by 16% in the fall of 2020, with new student enrollment decreasing even more and most institutions reporting international student deferrals (Baer and Martel 2020).