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EDITORIAL

Impact of COVID-19 pandemic on the scientific community

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Today, the world is experiencing a pandemic of a novel coronavirus (SARS-CoV-2) of probable zoonotic origin [1]. Animal pathogens are a potential driver of pandemic risk, with around 75% of emerging pathogens evolving from a zoonotic source [2]. Pandemics pose a widespread risk to humans and animals, and the effects are felt in environmental health and economic sectors [3]. Healthcare workers and scientists are at the frontline of the battle against the virus, and people around the globe are handling the situation the best they can. However, there is still no sign of decline concerning the morbidity and mortality associated with the novel coronavirus. Besides, this outbreak has created mayhem in the scientific community due to the COVID-19 intricacies. The scientific community has been experiencing a considerable negative impact from the COVID-19 outbreak, forcing the closure of universities, research centers, and laboratories. There are cancellations and postponement of most scientific events, including national and international conferences, symposiums, workshops, and training programs [4,5,6]. In addition, there are also widespread job losses and threatened livelihoods of millions as businesses struggle to cope with the lockdown put in place to control the virus.

Universities, research centers, and laboratories are the fertile grounds for the development of new ideas and the expansion of future agenda for the progress of science and scientific communities. Scientific events such as annual meetings of societies, national and international conferences, symposiums, workshops, elective training and clinical observerships, are significant grounds for the dissemination of research findings, to learn new skills, meet future supervisors, networking for further collaborations, and are the best platforms to search for career opportunities. These scientific events are crucial for early career researchers and scientists to introduce themselves and to present their research findings to a broader

international audience, which provides further motivation for future innovations. Nations across the world have imposed travel restrictions to curb the spread of the coronavirus outbreaks. Most scientific events scheduled through September 2020 have been canceled, and many more have been postponed, few have been able to convert to virtual meetings. Though these are responsible decisions and are in the best interest of our community, such changes will significantly hamper potential scientific innovations and have a tremendous negative impact on the career of researchers and scientists. The cancellation of scheduled annual meetings of scientific societies will delay setting future agenda and policy-making, as well as deferment of entire scientific research processes on a global scale. In addition to detrimental effects in the scientific field, there will be a substantial economic burden on the organizers, delegates, and sponsors of scientific events. Although few in-person conferences are converted into virtual conferences, attendance is difficult due to logistical issues, time zone differences for attendees, internet connectivity issues, inattentiveness of delegates and speakers, accessibility issues, etc. [4,6].

Additionally, many researchers, particularly from low and middle-income countries, have lost enormous opportunities for research awards and travel grants for 2020 scientific events. The reduction in scientific events and closure of the scientific workplace will result in the extension of research time, and, in some cases, will lead to re-starting entire experiments, or putting the experiments on hold, or downscaling them to a bare minimum, which will hamper the schedule of laboratories and research centers. The result of this will add to the economic burden of researchers, adversely affecting their career opportunities, ultimately fueling psychological stress, anxiety, tension or depression, culminating in reduced scientific output [7].

Besides the effects on younger early career researchers and scientists, the COVID-19 pandemic has also been detrimental to the academic environment in schools, colleges and universities, forcing students to wait an undetermined amount of time to begin their careers [8]. Additionally, immediate notification of the cancellation of scheduled university exams and convocations will result in substantial financial impacts due to cancellation of visas, travel tickets, hotel reservations, etc.

This COVID-19 calamity has led to hiring slowdowns or outright freezes across the country in the United States, Australia, and the United Kingdom, where institutions depend on tuition fees for survival. Dr. Karen Kelsky, an academic career coach, recently listed [9,10] more than 400 institutions in the US by May 2020 which had frozen hiring. This included leading research bodies such as Harvard University in Cambridge Massachusetts, Stanford University in California, as well as the entire University of California system. The University of Oxford in the UK announced a "recruitment freeze" in April. The rest of UK universities have yet to formally acknowledge any slowdowns or halts in hiring, but the freeze has probably spread across the country [11].

Conversely, universities in the European Union, where most researchers are supported by funding from the government or external agencies, are not yet in financial crisis and imposed hiring slowdowns. However, it is too early to conclude the impact of the ongoing pandemic on university budgets and engagement, as there is the possibility that this crisis may be much more damaging and longer-lasting than initially envisioned [11]. New graduates and PhDs who have not yet started their doctoral studies or postdoctoral fellowship are among the most vulnerable. Therefore, it is advisable to always have a plan b, possibly non-academic, as a back-up for a secure career.

Additionally, the majority of international collaborative research, including TB and HIV programs, clinical trials have grounded to a halt for an unknown period of time in low-income countries that are already highly vulnerable to public health crises [12]. Another tangible menace to the scientific community is the redirection of current funding to COVID-19. Dr. Jason Kindrachuk, an infectious disease expert who has been collaborating and working in Kenya, stated that many funders around the globe had been asked to make provisions for dealing with a decrease in budgets due to funding redirection, with a few funding agencies already announcing no-cost extensions for research projects [12,13]. However, a few leading research funders like the European Union's Horizon 2020 research program, US National Institutes of Health, UK Royal Society, Australian Research Council, Wellcome Trust etc., have offered support by introducing a series of measures to provide "administrative relief" such as extensions to the duration of funding, reallocation of research funds to meet the costs of working remotely, extensions to due dates for project reports, accommodation of late grant applications, providing stipend payments to fellows and trainees

and for running costs and salaries for employers for a specified duration for researchers affected by COVID-19 [14,15].

Overall, the ongoing global pandemic has been obstructing science communication and will delay scientific research and innovations. Globally, it has taken a grim toll on lives, health services, jobs, and mental health. Nobody is sure how long the coronavirus pandemic will last, creating an unpredictable future, with the only option left to adapt and find ways to endure and stay productive.

Optimistically, this will be just a fleeting change, without leading to long-lasting consequences. However, despite all the above-mentioned adverse impacts on scientific communities, this pandemic has given us the gift of a 'global mindset,' a real silver lining. In every new opportunity there can be difficulty, and in every difficulty new opportunity can be found; that is precisely what Albert Einstein said: "In the middle of difficulty lies opportunity." The novel coronavirus is giving us novel experiences and has taught us to deal with novel challenges in a novel way. Indeed, many scientists consider that during the lockdown period, there has been significant time to dedicate to long-pending work [13]. Research students should utilize the present lockdown time wisely, perhaps on analyzing data, writing a thesis or research articles and other web-based assignments, and of course, spending time with family and focusing on other core priorities. Additionally, scientific communities can contribute to overshadowing the widespread adverse effects of COVID-19 by addressing the falsehoods or misinformation circulating in social media, offering assistance to at-risk neighbours, and other meaningful public contributions and by promoting social solidarity.

The next generation of scientists and physicians must be trained for future pandemic preparedness to respond to any unexpected outbreaks and also should learn to strengthen scientific communication.

We hope the world will continue to learn more about COVID-19 and to control and contain the virus effectively. We should keep investigating, disentangling, and interrogating, only then will science thrive again, and the scientific community will function normally once again.

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