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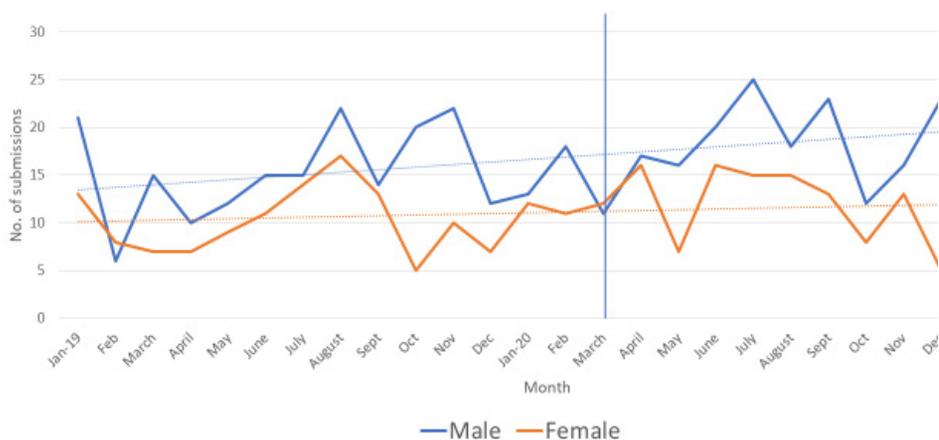
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AS THE GLOBAL Covid-19 pandemic reaches the one-year mark, its impact on those who carry out research in the population sciences¹ is beginning to be revealed. Even in the first few months of the pandemic, observers began to suggest that the main indicators of research productivity were showing signs of change. One change was a widening of an existing gender disparity (Krapf et al. 2016; Thomas et al. 2019) as female researchers in a range of social sciences, the natural sciences, and medicine submitted fewer papers for publication, deposited fewer manuscripts in preprint repositories, and registered fewer new projects (Flaherty 2020b; Muric´ et al. 2020; Viglione 2020). Such is the level of concern that the U.S. National Academies of Sciences, Engineering, and Medicine has undertaken a “fast track” study sponsored by U.S. government agencies and private foundations on the early effects of the Covid-19 pandemic on the careers of women in academic science, engineering, and medicine (National Academies of Science, Engineering, and Medicine 2020).

Statistical analyses of early data on authorship of published manuscripts and preprints demonstrate the same basic result—women are falling further behind men in this measure of research productivity (Fredrickson 2020; Vincent-Lamarre et al. 2020). For example, one study of more than 40,000 preprints in the social sciences showed that between March and May 2020, while total preprints increased by 35 percent, male researchers were responsible for most of that increase; preprints submitted by female researchers dropped by 13.2 percent relative to male researchers in the United States. The analysis also found that the relative decrease in female productivity was greater for assistant professors (vs. post docs and senior professors) and for those in top-ranked universities (vs. lower-ranked universities).

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FIGURE 1 Submissions to *Population and Development Review* by sex of first/sole author (2019–2020)



Similar results were observed in six additional countries (Cui et al. 2020). This result appears to be the case for both new research papers related to Covid-19 as well as to research more generally (Amano-Patiño et al. 2020; Bittante et al. 2020; Pinho-Gomes et al. 2020). In *Population and Development Review* (*PDR*), overall submissions in 2020 were up by 26 percent compared to 2019. This phenomenon has become common in scholarly journals across disciplines (Dolan and Lawless 2020; Flaherty 2020a; Rasul 2020), including demography² (Hayward 2020). At the same time, there is some evidence of a widening gender difference in submissions by sex in the international pool of researchers who submit to *PDR*; male first or sole authors of submissions to *PDR* exceed those of females by about 45 percent during the period January 2019–March 2020 (226 and 156 submissions, respectively) and 57 percent during April–December 2020 (170 and 108 submissions) (Figure 1).³ Submitted papers generally represent the result of many months or years of work, and—even for work already in progress—the process of finalizing a paper for submission to a journal requires a concentrated (and ideally, uninterrupted) period of time in front of a computer.

Why has female research productivity, and leadership in research products, faltered during this global crisis? The existence of gender disparities, which predated the Covid-19 pandemic, is generally attributed to the exacerbation of existing inequalities within and outside the workplace. Within US higher education institutions for instance, women make up only 31 percent of full-time faculty and at four-year institutions women represent just 27 percent of tenured faculty (Kelly 2019). When these data are examined by race/ethnicity, the disparities are even more stark (Hur et al. 2017). Additional research shows gender differences in the distribution of research and

nonresearch time and roles for male versus female faculty (Mitchell and Hesli 2013; Babcock et al. 2017; Guarino and Borden 2017; O'Meara et al. 2017). A study with over 6,000 associate and full professors across 13 US universities using a time-use diary approach found that female faculty spent more time than their male counterparts on campus/institutional service, student advising, and teaching-related activities and received additional pressure at the same time to become involved in further teaching, student advising, and professional service (O'Meara et al. 2017).

Given these existing patterns, it is perhaps not surprising that gender gaps in research productivity have grown in the midst of a global crisis. Over the last year, both anecdotal and emerging research are showing that women have taken on more caregiving responsibilities (of children, parents, or other family members), compared to men. Women with young children in particular report fewer available working hours (Krukowski et al. 2020). As women expand their caregiving responsibilities (often during the workday, for instance to support children with virtual schooling) and meet their nonnegotiable work responsibilities (e.g., classes that must be taught, fundraising deadlines that must be met), they may be unable to protect their scant research time. These disparities may be further compounded among those who are more junior in their fields, with limited access to mentors and fewer opportunities for networking—both key elements for establishing productive research collaborations. More junior researchers may also have less flexibility to decline or reduce nonresearch tasks than their senior counterparts.

While the short- and medium-term impacts of the pandemic on the productivity and careers of established researchers may be increasingly coming to light, it is much less clear what the longer-term impact will be on the trajectory of those who have newly entered the field of population sciences or who seek training at the graduate level. Beyond growing gender disparities in publication, the pandemic is likely to reshape the population sciences field in numerous ways, including the geographic representation, international experience, and areas of focus for new researchers. Funding for graduate training in the population sciences (and disciplines within it) has fluctuated over the last few decades but potential students from low- and middle-income countries have been especially affected as earlier dedicated sources of graduate funding from the United Nations, governments, and other funding institutions in high-income countries have shrunk or shifted to other fields (Menken et al. 2002; Hur et al. 2017). As was the case early in the HIV epidemic, the Covid pandemic could shift funding toward training for epidemiology, public health, as well as population sciences research that contributes to tracking, modeling, and monitoring the pandemic (and its probable successors) as well as toward research that examines its social and economic effects. A multitude of examples of the contributions that population sciences research can make to the pandemic response have already been published (see IUSSP 2020).

There have been numerous accounts in the popular media of the predicaments faced by international students who have been stranded or otherwise negatively affected by pandemic-related university and government policies (Dickerson 2020; Fox 2020). In the long run, it is not clear what this will mean for training of population scientists at the global level but, at a minimum, it seems likely to delay the completion of training for the current cohort of students, possibly curtail the admission of new students temporarily, and, depending on the course of the pandemic and the evolution of policies and funding, may influence the decisions of students about where to get training.

For early-career researchers in the population sciences—graduate students, post-docs, those in first jobs—fieldwork experience is often seen as a useful qualification leading to subsequent success in publishing, funding, and employment. With the pandemic indefinitely limiting or modifying the type of in-person survey and other data collection work that forms the basis of much population research (as well as severely restricting travel), the opportunities for young researchers to gain this experience safely may be limited. At the same time, there may be opportunities to contribute to methodological advances in new and modified ways of collecting population information (White et. al 2020) and to conduct research on important emerging questions related to the consequences of the pandemic on various population groups.

While current concerns about the pandemic are most salient, it is also worth noting the potential longer-term impacts that the Covid-19 pandemic may have on education and employment opportunities for young people in the US and around the world. Results from the first full school term during the Covid-19 pandemic in the US reveal dramatic increases in the proportion of students with failing grades around the country—representing both poor performance and lack of participation. A recent national assessment of learning during Covid-19 (Kuhfeld et al. 2020) found that students in grades 3–8 performed similarly to students in those grades in 2019, but about 5 to 10 points lower in math than students in 2019. Students in older grades tended to do a bit better in maintaining performance relative to 2019 than students in lower grades, reflecting older students' ability to work independently outside of school. However, the report is missing data on 25 percent of students included in 2019, who are predominantly low-income Black and Hispanic students, and also most likely to be disadvantaged by remote learning. The longer-term effects of these shifts on access to higher education, especially among the most affected groups, remain to be seen, but may well change the distribution of adults receiving a graduate education in the future.

Yet the effects of Covid-19 on education prospects are not limited to the countries that have been hard-hit by the pandemic to date. The World Bank has estimated that school closures in response to Covid-19—which occurred in many countries reporting few confirmed cases—will shave off 0.6 years of schooling for children worldwide, and that an additional seven million

young people will drop out of school due to Covid-19 (Azevedo et al. 2020), on top of the millions who were out of school already (UNESCO 2020). In terms of the effects on learning, the Education Commission estimates that an additional 10 out of every 100 school-aged children will enter “learning poverty” as a result of the pandemic, meaning they will be out of school, or they will remain in school but unable to read a basic text (Save our Future 2020). As is often the case in times of crisis, those likely to be most affected are young people who were at a greater disadvantage to begin with, such as girls living in poor households and rural communities.

While the effects of the pandemic on the work of researchers in population science and other scientific disciplines may be of minor importance in comparison to its disastrous health and economic effects, the year 2020 has laid bare a host of painful realities faced by researchers that are in need of documentation and analysis. Further, effectively rebuilding after this crisis will require creative sustained effort from many fields—including the population sciences—and those efforts will be most effective if they are undertaken by a broad and diverse group of researchers, including those most affected by this crisis. There are challenges facing all population researchers but the issues may differentially affect women, parents of young children, early career researchers, those who work in hard or soft funding environments, and those working in particular countries or regions. As US-based researchers who work internationally, we acknowledge that our perspective is influenced by our own experience confronting multiple national crises over the last year, and that the perspective of researchers from other countries or regions is likely to be different. Nevertheless, a minimum step that would be universally beneficial would be to gain a better understanding of who is contributing to population science. This could be achieved by improving and standardizing the collection and reporting of data on journal submissions, publications, manuscript reviews, participation in conference panels (Lange 2020), and other markers of research productivity by sex and other characteristics, such as geographic location, race/ethnicity, and career stage. Observers of recent events have also recommended a critical examination of institutional childcare leave policies, of time spent on research vs. other activities such as fundraising, mentoring, and institutional service (Myers et al. 2020), of stigma related to spending time on caregiving activities (Gewin 2020), and work-life balance and mental well-being of researchers (Raabe et al. 2020).

While there are numerous negative consequences of the pandemic, there are also glimmers of improvement for researchers related to increased flexibility in work hours and reductions in commuting time due to working at home. Some donors in the population sciences have allowed grantees to repurpose funds to accommodate changing conditions or granted extensions and/or additional funds for urgent Covid-related research. Further, training and experience in the population sciences may be an increasingly valuable

asset for understanding the dimensions of current and future dilemmas, especially if researchers are intentional about producing and communicating results that are useful for policymakers and other stakeholders⁴ (Donaldson 2011). Overall, the COVID-19 pandemic may offer an opportunity for those with a stake in the future of the population sciences to take action to address long-neglected challenges that are unlikely to be resolved quickly or without substantial effort and agreement on needed actions.

Notes

1 The field of population sciences is not well defined but we refer broadly here to the interdisciplinary field that focuses on clarifying the causes and consequences of population change and the interrelationship between demography and biological, social, and economic phenomena. “Demography” is contained within the larger field of population sciences. Those who work in the population sciences are likely to have advanced training in one of the social or health sciences (Menken et al. 2002).

2 Mark Hayward, editor of *Demography*, reported on Twitter that the journal reached a new annual record of submissions at 600 manuscripts on December 20, 2020.

3 Since journals do not collect information from authors of manuscript submissions on their sex, all analyses of these data attribute sex via specialized software or some other means. For the analysis of *PDR* submissions, names were manually coded with the assistance of internet searches where needed. A small percentage (5–7 percent) of names were excluded because the sex of the author based on the name was indeterminate.

4 As former Population Council President Peter Donaldson observed, “Public demography is not a program for science writers or popularizers but an activity for serious analysts who identify important problems, analyze them carefully, and write or talk about them in an engaging way before public audiences.” (2011)

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