2-1-2021

Covid-19 and the Global Demographic Research Agenda

Landis MacKellar
Population Council

Rachel Friedman
Population Council

ESSAYS

Covid-19 and the Global Demographic Research Agenda

POPULATION AND DEVELOPMENT REVIEW

FEBRUARY 2021

Population and Development Review seeks to advance knowledge of the relationships between population and social, economic, and environmental change and provides a forum for discussion of related issues of public policy.

Population and Development Review (ISSN 0098-7921 [print]; 1728-4457 [online]) is published quarterly by Wiley Periodicals LLC on behalf of the Population Council.

Population and Development Review
Population Council
One Dag Hammarskjold Plaza
New York, New York 10017 USA

Published February 2021.

Suggested citation: MacKellar, Landis and Rachel Friedman, eds. *Covid-19 and the Global Demographic Research Agenda*. New York: Population Council, 2021.

COVID-19 AND THE GLOBAL DEMOGRAPHIC RESEARCH AGENDA

Landis MacKellar
Rachel Friedman
Editors

POPULATION AND DEVELOPMENT REVIEW

ESSAYS

POPULATION COUNCIL
New York

THIS PAGE LEFT INTENTIONALLY BLANK.

CONTENTS

Introduction

Landis MacKellar
Rachel Friedman

The field of population studies that *Population and Development Review* serves has responded briskly to Covid-19, with webinars, virtual conferences, special issues, and more. Our attitude at PDR was to take a deep breath and a look around to see which way the wind blew.

Now, of course, there has been ample time to know with confidence which way it blows: the Covid-19 crisis and its aftermath will be with us all around the world for many years to come. Implications for geopolitics, macroeconomies, labor, financial, and commodity markets, the environment, technology and innovation, health care systems, gender, racial and ethnic inequality, and more will be profound and durable. As will effects on the core interests of demography: mortality, fertility, migration, urbanization, family and social structure, and the resulting implications for socioeconomic, environmental, and technological regimes.

Much peer-reviewed research on Covid-19 published in journals like *PDR* will take months or years to complete. Yet, it became increasingly clear to us in the weeks following the onset of the pandemic that we could offer an alternate kind of scholarly space to explore current and potential impacts of the virus, an essay space. So, we invited a group of recent *PDR* authors and Population Council researchers to respond to the following question: How do you see Covid-19 shaping global demographic research needs over the next five to ten years? We were rewarded with 16 wide-ranging essays covering much ground in few words. These thoughtful reflections offer a time capsule of sorts on current thinking in the field.

Some common themes emerged: calls for more interdisciplinary collaboration and investment in high-quality data, for example, and reflections on demography's role when it comes to issues of inequality and governance. Researchers' interests are naturally revealed. While some focus on needs and opportunities in terms of data and analysis, others are concerned with future generations of demographers and their research priorities. There is some broad scope overlap, but each essay offers a distinct vantage point from which to view the future of demographic research.

https://doi.org/10.31899/pdr1.1016

Moving to specifics, a number of contributors call for better data, including data from innovative sources and approaches. A particular impact cited is that Covid-19 has disrupted plans for the 2020 census round. There is a sentiment that demographers should see themselves not merely as producers of data consumed by researchers in related disciplines such as economics, sociology, and public health. Enhanced collaboration is a theme that runs throughout the contributions. Since Covid-19 is similar in certain ways to other adverse life events (illness, divorce, job loss) studied by family demographers, the pandemic might also push the interdisciplinary life-course approach more firmly to the center of demography. Since the pandemic may undo decades of progress in advancing gender equality, its impact on reproductive health, even the structural shift toward lower fertility in many developing countries, deserves attention.

The issue of research transparency as a strategy for combating the growing mistrust and politicization of science is raised. So, too, is the importance of comparative research, especially at the international level, to disentangle the effects of the disease itself from underlying social conditions and responses, not only in public health narrowly speaking, but in governance more broadly. There are issues of how statistics in our data-driven world are being interpreted through cognitive and moral frameworks, population-wide and at individual and personal levels. Demographers have a responsibility not only to help the public better understand and interpret the statistics being disseminated at a frantic pace, but also to reflect on how they themselves are affected by these data.

While some contributors look outward—data needs, new methods of dealing with them—some look inward to reflect on the field itself. Who will be producing the needed demographic research? Gender gaps are likely emerging as the pandemic disproportionately affects women at the peak of their research productivity, and their students, with long-term impacts. International graduate study, heavily concentrated in the United States and Europe, is being disrupted. The global scope of research may narrow due to increased difficulty of fieldwork. As the need for field-based research grows, there is risk that it becomes more difficult and hence less attractive for researchers starting out.

We look forward to revisiting the issues raised in these essays in the years to come, and to reevaluating their global impact on demography and demographers. Even more, we look forward to the day when the most acute and painful phase of this pandemic is behind us—when we can finally, fully exhale that deep breath.

Coronavirus, Cohorts, and International Demography

Keera Allendorf

In the short term, the pandemic presents a profound period effect. In 2020, as the novel coronavirus spread and mortality rose, governments closed borders, public events evaporated, and economic hardship skyrocketed. Steep age effects of the pandemic were also rapidly apparent. The risk of dying of Covid-19 is dramatically higher among the elderly and especially low among young children.

Yet, when asked to consider how Covid-19 may shape future demographic research needs, my mind kept turning to cohort effects, the diagonal axis of demography's time trio. I fear the pandemic will adversely shape the composition and research interests of cohorts of future demographers. Specifically, the pandemic may make upcoming cohorts of demographers more American and less likely to engage in international research, especially fieldwork. In turn, future demographic research may become less comparative and more US-focused.

Cohorts of demographers who experience the pandemic during graduate school may be pushed toward solely quantitative, US-based dissertations. US-origin students who study populations outside the US often complete mixed-methods dissertations with fieldwork components. The pandemic likely forced advanced students to stop fieldwork early and cancel upcoming fieldwork plans. Beginning graduate students may well decide planning and completing international fieldwork is too risky or practically impossible for the next few years. International travel funds and fellowships appear to be disappearing as budgets contract. Pre-dissertation trips to assess potential field sites may never occur. And, years-long processes of taking language classes may seem like a waste of precious time. Instead, graduate students may turn to the safer route of analyzing survey data collected in the US. Once solidified, this approach may persist long past graduate school.

Younger cohorts of Americans who may become demographers farther into the future are likely missing experiences that would motivate and pre-

Keera Allendorf, Department of Sociology, Indiana University.

https://doi.org/10.31899/pdr1.1000

pare them to embark on international fieldwork later in life. The pandemic put many study-abroad trips, which undergraduates undertake within a brief window, on hold or out of financial reach. Entry-level jobs in organizations where college graduates gain international experience disappeared or shrank with pandemic-induced travel freezes and budget cuts. The pandemic motivated many high school students to take gap years before college, but these breaks do not feature international travel.

My fears are based on considering the counterfactuals of my own life as an emerging demographer. A foundational experience of my research is dissertation fieldwork undertaken in 2007–08 in a village in India. That academic year depended on long-term planning, funding, and language classes, as well as an extra year of school spent waiting for a research visa, from 2002–07. Many experiences before graduate school were also instrumental. Working at the International Center for Research on Women in 2000–02, I made my first trip to India and learned of the existence of demography. Earlier, in 1998, a study-abroad program in Nepal provided inspiration for my dissertation research questions, as well as language and field experience. And as a teenager, my interest in the region was galvanized by my sister's time in Nepal as a Peace Corps Volunteer in 1992–94. If a pandemic had occurred in 1992, 1998, 2000, or any point from 2002–08, I may never have gone to India for my dissertation and my research agenda may well have turned to the US.

Reflections on experiences of my colleagues who are not of US-origin suggests upcoming cohorts of demographers may also become more American. Since demography is not a staple of secondary schooling many of us encounter the discipline by accident as undergraduates or even graduate students. As a small field, demographers tend to be trained in a small number of universities, many of which are in the US. Many young people only encounter demography and become demographers if they attend one of these universities. With the pandemic, these universities are not sending staff on trips to recruit international students. Further, many prospective students may choose to stay close to home in the uncertain context of the pandemic or no longer have the finances to support schooling abroad. Inhospitable immigration policies of the US, which worsened in the pandemic, will also push international students away from American universities. And, for those who are farther along, the pandemic-induced collapse of the job market may be even more devastating for those who are not American citizens. These newly minted demographers require immediate academic jobs to stay in the US and, in some cases, stay in demography.

Such cohort effects could reduce the quality of demographic research and theory for years to come. A scarcity of fieldwork will limit our understanding of demographic processes on the ground and our ability to build explanations of how and why these processes vary and change. Two decades ago, Knodel (1997) laid out a compelling case for the use of qualitative

methods for demographers, which remains equally relevant today. As he noted, when demographers themselves use qualitative methods the resulting research is especially dense with demographic insights.

I want to highlight other longer-term, more hidden benefits of such work, though. Ethnographic observation and collection of less structured interviews allow—even force—researchers to be highly involved with the populations they study (Axinn and Pearce 2006). Such involvement leads to deeper understanding, which is invaluable when demographers study populations to which they do not belong. Reading is vital, but there is a more visceral understanding when reading is combined with on-the-ground experience. Such understanding stimulates new research questions and hypotheses, as well as better measures and modeling, when we use quantitative methods and data, sometimes years later. For instance, what I encountered during fieldwork resonated so strongly with developmental idealism theory that I devoted much of the last decade to assessing the influence of developmental idealism on demographic behavior.

One reason fieldwork is so generative is the analytical power of comparison. The deeper knowledge gained through fieldwork comes in part from comparison to other populations the researcher knows from personal experience. As social scientists we are informal ethnographers of the populations we live in—drawing inspiration and understanding from our own lives and those around us. Fieldwork inevitably includes ruminating on how and why life in the study population differs from home or a "reference" population. Like learning another language, such comparisons enable richer understanding of both contexts. It was only through learning to use postpositions in Nepali that I really understood prepositions in English. Similarly, comparisons of my Indian fieldwork to interactions with my husband's family in Greece fueled insights into family demography. Parallels with Indian interviews helped me quickly grasp my Greek grandmother-in-law's story of her arranged marriage. Yet, seeing this senior woman do all the cooking made me rethink generational dynamics of joint families.

Fieldwork is not the only way demographers become involved with other populations, though. Living and working or attending school in another country is another way to gain such involvement. This link is one reason it is important future cohorts include demographers who are not from the US. Their ability to compare their current context to where they used to live also provides unique demographic insights and inspiration. When asked by a journalist about the motivation for work on Indian one-child families, Sonalde Desai explained, "There is interesting work in the US on ways in which women combine career and motherhood by limiting themselves to a single child. I was surprised to see the number of people I saw around me [in the US] with a single child and wondered if the same processes might be operating in India" (Lopez 2020).

While I am concerned about adverse cohort effects, I am also heartened by new opportunities for international research presented by the pandemic. First, the normalization of online meetings and webinars may facilitate international exchanges and collaborations. We are now adapted to traversing distances virtually. Seminar series and conferences may include occasional webinars with speakers "zooming in" from afar even when most events are in-person. The new practice of making recordings, as well as data and code, available online might even send demography into the hands (and ears) of future demographers located anywhere with a smartphone and an internet connection.

Second, indirect effects of the pandemic may improve the balance of international comparisons. The surging Black Lives Matter movement in the US seems to have been aided in part by unsettling caused by the pandemic. There is new recognition of the importance of Black scholars and scholarship on race in demography and other fields. This heightened energy around diversity may extend beyond racial hierarchies within the US to international hierarchies as well. While demography is more international than many disciplines, there is a lingering US orientation. Publishing on India and Nepal, reviewers often exhort me to justify the study location and discuss the relevance of the findings to the US. By contrast, the importance of the US is often taken for granted and authors of US studies are not usually pushed to address the relevance of their findings to other places.

I hope a broad view of diversity motivates us to decenter the US, rather than abandoning comparisons. Pressure from reviewers to make comparisons benefited my research. Considering precisely how and why processes we are studying in one population differ from those in others is exactly the type of theory-building work demographers should engage in. It is the US orientation that could be rebalanced. Comparisons to the US are often useful, but in many cases comparisons to other populations are more instructive. And, even when studying the US, we should consider how our findings fit into theories of how and why demographic processes unfold in a broader global landscape.

Before closing, I want to address two incongruities in these reflections. Ironically, while pointing to the value of decentering the US, I focused these reflections on the US. This orientation is no accident. It is US demography that seems most at risk of these adverse cohort effects and most in need of international perspectives. Americans must go a long way to gain substantial international experience and many never do so. Further, many demographers working and training in the US are located within sociology departments. Sociology's strong US focus seeps into demography.

The US also plays an outsize role in demography as the base of many demographers, as well as leading demography journals. A comparison of the relative size of professional associations provides a rough measure of this

outsize role. In 2021, the Population Association of America (PAA) is nearly twice as large as the International Union for the Scientific Study of Population (IUSSP) and four times larger than the European Association for Population Studies (EAPS). According to their respective websites, PAA has over 3,000 members, IUSSP's membership stands at 1,600, and EAPS has just under 700.

Finally, while I hope our tradition of an international, comparative demography persists well beyond the pandemic, I also want to emphasize that populations do not map neatly onto national borders. Often, the farther from home we go, the more different things are, and the more we learn. We do not always have to venture to another country though. Even in the US, traveling to another region, or sometimes just down the street, can enmesh one in a different demographic reality.

References

Axinn, William G. and Lisa D. Pearce. 2006. *Mixed Method Data Collection Strategies.* Cambridge: Cambridge University Press.

Knodel, John. 1997. "A case for nonanthropological qualitative methods for demographers," *Population and Development Review* 23(4): 847–853.

Lopez, Rachel. 2020. "How one-child families are transforming India," *Hindustan Times,* 29 February. Accessed October 16, 2020. https://www.hindustantimes.com/more-lifestyle/how-one-child-families-are-transforming-india/story-ATc9DORXLK1RS3fBXCub4K.html.

Covid-19 Global Demographic Research Needs? Replacing Speculative Commentaries with Robust Cross-national Comparisons

Eva Beaujouan

The world is currently undergoing a pandemic-induced crisis transformative of human needs and behaviors. How can demographers contribute to understanding Covid-19 and its consequences? Disparities between countries, and social, gender, and economic inequalities within them, were present well before the crisis and long studied by demographers. Covid-19 presents demographic researchers with a renewed and enhanced opportunity to contribute to the fight against inequality. Demographers can assist countries in their recoveries over forthcoming years by collecting, compiling, and analyzing data on how the crisis unfolded, generating knowledge about changes in social and individual behaviors and adjustments in the population, and identifying what triggered them. Highlighting how the crisis and policy responses to it affected people may help policymakers better promote resilience and prepare for future crises—assuredly the next disease crisis, but also notably the climate emergency as well. In this comment, I argue that the Covid-19 crisis has increased the need for international comparisons, and hence for better comparative data.

Why Do We Need International Comparisons?

Cross-country studies are central to understanding demographic processes, and frameworks dear to demographers such as the demographic and epidemiological transitions, and Esping-Andersen's welfare state classification, could not have been developed without comparative data. Such studies allow unraveling the mechanisms that underpin macro-level trends and inter-

Eva Beaujouan, University of Vienna (Wittgenstein Centre for Demography and Global Human Capital [IIASA, OeAW, Univ. Vienna]).

https://doi.org/10.31899/pdr1.1001

country disparities, but they are time- and data-intensive. Despite a surge in comparative Covid-19 mortality studies (Dudel et al. 2020; Esteve et al. 2020; Kontis et al. 2020), such comparisons are likely to be underrepresented in most explorations of the consequences of the pandemic, particularly in those that focus on the role of socioeconomic factors, as well as on processes that are difficult to quantify such as migration and union dynamics. The challenges are compounded by the fact that these processes require data on individual characteristics and contextual variables as well as measurement of the demographic outcomes.

The crisis affects society at different levels, and beyond the health aspect it has important economic and social effects that vary by country. The illness and Covid-associated "lockdowns" (one of the Oxford English Dictionary's Words of the Year for 2020, borrowed from American prison argot) have, directly or indirectly, led to an explosion in unemployment, precarity, and economic uncertainty, and a deepening of social, gender, or ethnic inequalities (Copley et al. 2020; Farré et al. 2020; Lambert et al. 2020; Magnusson et al. 2020; Reichelt et al. 2020). Depending on the prevalence of the virus in the country and on the response, a significant share of persons are suffering mental and physical health issues associated with Covid-19, the lockdowns, and uncertainty (Xiong et al. 2020).

If research is confined to the most-affected countries, the richest countries, or countries with the best data, this can lead to a biased perception of the impact of Covid-19. Aassve et al. (2020) expect very different consequences of the crisis for fertility depending on the world area, and particularly its socioeconomic development. The same way, migration and health long-term impact will probably vary depending on the country. Countries have not been evenly exposed to the pandemic, they differ in social organization and demographic structure, and have not reacted in the same way. Results derived from a single context would thus likely lead to a misunderstanding of the crisis and its consequences.

Cross-national comparative studies to understand the impact of differences in culture, preparedness, and policy responses are particularly difficult to implement because of the diversity of the units of analysis at least at three levels: economic and cultural diversity, demographic variation, and data comparability between countries. World areas are at different levels of development, and also within areas, variations occur, linked, for instance to the political and welfare regime. Countries' demographic characteristics vary according to their stage of the demographic transition, but even at similar stages, differences in culture, economy, and health system lead (among others) to different family structure and fertility levels, migration mechanisms, and life expectancy. And finally, there is a large inconsistency in data available across the world but also in very similar countries.

Despite, but also because of, these challenges, a set of robust, comparative observations across multiple countries is needed to allow countries to

assess the success of their short- and long-term responses, relative to other countries, in achieving wanted results in the face of the crisis while avoiding unwanted ones. They can reveal structural regularities—whether of demographic, social, or governance dimension—with meaningful implications for policy (Kontis et al. 2020). This implies carefully taking the above-mentioned considerations into account. Notably, to tailor the studies to analyze a small sample of countries that are credible comparators, for instance regional comparative studies; to implement the analyses taking into account the demographic structure and welfare regime by isolating shared and country-specific features; but above all, to increase the capacity to collect and disseminate comparative data.

Toward Comparative Studies on Fertility and Family in the High-Income Countries

I pursue with examples how studies of fertility and family in the high-income countries would benefit from international comparisons and data. During the short- and medium-term crisis, suddenly altered circumstances probably lead to fertility postponement. This would result from the adverse economic situation, uncertainty about what the future holds, changes in partnership dynamics due notably to closure of social venues, decreased sexual activity (documented in several high-income countries), and more uneven access to health care and Assisted Reproductive Technologies (ART). On the other hand, more difficult access to abortion and to contraception in some settings, as well as an increase in intimate partner sexual coercion and assault may trigger a rise in unwanted births following the lockdowns. Preliminary findings on fertility intentions in the initial phase of the pandemic point to a birth recession in the high-income countries, but the extent of such a downturn in fertility is likely to vary across contexts (Lindberg et al. 2020; Luppi et al. 2020). In addition, as conditions ease, lagging economic recovery, delay in leaving the parental home, weakened intentions to have children, as well as having reached the biological age limit for fertility or no longer being able to pay for ART, can lead to an inability to recuperate lost fertility. Country conditions will probably determine to which extent the downward blip on fertility will be made up as societies return to a pre-pandemic norm. To observe these various aspects, local specialized studies will be very useful, but to generalize them, comparative studies are needed.

Research on the family consequences of Covid-19 has started, but it is scattered across different countries and suffers from a lack of data (Guetto et al. 2020; Relationships Australia 2020; Wagner et al. 2020; Wilde et al. 2020). As in the case of employment and mortality (Drefahl et al. 2020; ECDC 2020), the crisis may more strongly affect already-disadvantaged people, because they are more likely to experience economic hardship and this increases the

likelihood of separation and the transition to a single-parent family. Younger generations, already at a particular disadvantage compared to their parents, may see their situation worsen: delayed family formation, fragilized romantic relationships, "boomerang" return to parents' residence, school- or university dropout. Family organization particularly suffered during the lockdowns, mostly due to the erosion of hard-won improvements in the gender division of labor in the home and women leaving the labor force to care for children. They will find it hard to get back in. Finally, reduced ART access and the lack of time to catch up on postponed births mentioned above may reinforce the inability of women with a high level of education to have all the children they originally wanted.

Overall, we can propose tentative theories and we have the know-how to study the consequences of the crisis for fertility and the family (and I think that we can generalize this to other aspects of demographic behavior). However, to understand what underlies changing family dynamics in the age of Covid-19, we need to set these studies in their international context, and for this we need data.

Data Needs and Data Resources

Beside drawing attention to wide cultural and structural variations between countries, for demographers the crisis has underlined the preexisting differences in data availability. Countries in which register data linked to other administrative datasets are available are best placed to conduct advanced studies of the impact of Covid-19 on the population. Other countries are critically short of data and have not been able to conduct surveys specific to the Covid-19 period, which will lead to a severe lack of information on the impact of the virus.

Data useful to study the consequences of the Covid-19 pandemic vary in nature. Repeat surveys, retrospective surveys, and population registers are useful to observe breaks in trends during the crisis and variations across countries, even without adding Covid-specific questions. Purpose-designed surveys with a few questions related to the pandemic (for instance change in economic situation, in fertility plans, in health), as well as panel studies following individual situations, can bring additional information about the short-term consequences of the Covid-19 pandemic, and be asked across multiple countries. In addition, cross-country population surveys can be adapted by adding Covid-specific questions during or after the pandemic. Such surveys have the advantage of having an existing set of core questions that identify individual and household characteristics (e.g., social status, level of education, birth histories); alongside which, details about the pandemic can be explored. Finally, digital data also have a large potential to bring insights on the crisis.

In light of this, the need to strengthen cross-national data infrastructure for integrating data from different types of sources, registers, as well as surveys is becoming more pressing. The Human Mortality Database helps monitor excess deaths across the high-income countries with its Short-term Mortality Fluctuations data series, and INED has developed a database on the Demography of Covid-19 Deaths by age and sex (https://dc-covid.site.ined.fr/en/) in response to the pandemic. Other consequences of Covid-19 across countries may be observed later via the Human Fertility Database, IPUMS-international that provides micro census data, and the IMAGE project that has assembled comparative statistics on internal migration (www.imageproject.com.au). But such data are not sufficient to compare social inequalities, for which detailed individual data with a uniform survey design across countries are necessary. Population surveys that belong to the Generation and Gender Programme and SHARE offer core demographic questions common to a range of high-income countries, and together with studies with smaller samples such as the World Value Surveys or European Social Survey they will be very valuable, especially if they ask pandemic-related questions. Register data linked to administrative data could be made available for use in more countries, but this requires working further on the legal and institutional framework of making such data available for research (FORS and inkhub.ch 2020). Availability and distribution of international data have advanced in the last two decades, but we still lack a central repository, or even a definitive source of advice on the availability of comparative data that would provide a foundation for international projects and facilitate the development of international research.

Conclusion: Further Develop Robust, Cross-Nationally Comparative Datasets

The overarching research agenda of demographic research may not change much: trying to improve the living conditions of people across the planet by helping societies "understand and anticipate the population dynamics they are experiencing" (UNFPA 2020, p. 2). With this crisis, we have stronger reasons and incentives to carry it through. Demographers have been working for a long time with epidemiologists, geographers, economists, sociologists, reproductive health specialists, and so forth. Uniting further with other disciplines that bring their skills, perspectives, and data would help to answer the needs emerging from the crisis, and facilitate clear and timely communication of results. For demographers to most effectively bring their insights to bear on Covid-19, however, we need to intensify our efforts to develop robust, cross-nationally comparative datasets that extend beyond our traditional focus on simple summary indicators of births and deaths.

References

Aassve, A., N. Cavalli, L. Mencarini, S. Plach, and M.L. Bacci. 2020. "The COVID-19 pandemic and human fertility," *Science* 369(6502): 370–371. https://doi.org/10.1126/science.abc9520.

Copley, A., A. Decker, F. Delavelle, M. Goldstein, M. O'Sullivan, S. Papineni. 2020. "COVID-19 pandemic through a gender lens." *Africa Knowledge in Time Policy Brief* 1(2). Washington, DC: World Bank.

Drefahl, S., M. Wallace, E. Mussino, S. Aradhya, M. Kolk, M. Brandén, et al. 2020. "A population-based cohort study of socio-demographic risk factors for COVID-19 deaths in Sweden," *Nature Communications* 1–7. https://doi.org/10.1038/s41467-020-18926-3.

Dudel, C., T. Riffe, E. Acosta, A. Van Raalte, C. Strozza, and M. Myrskylä. 2020. "Monitoring trends and differences in COVID-19 case-fatality rates using decomposition methods: Contributions of age structure and age-specific fatality," *PLOS ONE* 15(9) e0238904. https://doi.org/10.1371/journal.pone.0238904.

Esteve, A., I. Permanyer, D. Boertien, and J.W. Vaupel. 2020. "National age and coresidence patterns shape COVID-19 vulnerability," *PNAS* 117(28): 16118–16120. https://doi.org/10.1073/pnas.2008764117.

European Centre for Disease Prevention and Control (ECDC). 2020. "COVID-19 clusters and outbreaks in occupational settings in the EU/EEA and the UK." Stockholm: ECDC.

Farré, L., Y. Fawaz, L. González, and J. Graves. 2020. "How the COVID-19 lockdown affected gender inequality in paid and unpaid work in Spain." *IZA Institute of Labor Economics. IZA Discussion Paper* Number 13434. https://ssrn.com/abstract=3643198.

FORS and linkhub.ch. 2020. "Accessing and linking data for research in Switzerland." Report. https://linkhub.ch/wp-content/uploads/2020/11/Report_Data_Access_and_Linking_11_2020-1.pdf.

Guetto, R., D. Vignoli, and G. Bazzani. 2020. "Marriage and cohabitation under uncertainty: The role of narratives of the future during the COVID-19 pandemic," *European Societies.* https://doi.org/10.1080/14616696.2020.1833359.

Kontis, V., J.E. Bennett, T. Rashid, R.M. Parks, J. Pearson-Stuttard, M. Guillot, et al. 2020. "Magnitude, demographics and dynamics of the effect of the first wave of the COVID-19 pandemic on all-cause mortality in 21 industrialized countries," *Nature Medicine.* https://doi.org/10.1038/s41591-020-1112-0

Lambert, A., J. Cayouette-Remblière, É. Guéraut, G. LeRoux, C. Bonvalet, V. Girard, and L. Langlois. 2020. "How the COVID-19 epidemic changed working conditions in France," *Population and Societies* No. 579.

Lindberg, L.D., A. Vandevusse, J. Mueller, and M. Kirstein. 2020. "Early impacts of the COVID-19 Pandemic: Findings from the 2020 Guttmacher Survey of Reproductive Health Experiences." Guttmacher Institute report. https://www.guttmacher.org/report/early-impacts-covid-19-pandemic-findings-2020-guttmacher-survey-reproductive-health

Luppi, F., B. Arpino, and A. Rosina. 2020. "The impact of COVID-19 on fertility plans in Italy, Germany, France, Spain, and the United Kingdom," *Demographic Research* 43(47): 1399–1412. https://doi.org/10.4054/DemRes.2020.43.47.

Magnusson, K., K. Nygård, L. Vold, and K. Telle. 2020. "Occupational risk of COVID-19 in the 1st vs 2nd wave of infection," *medRxiv* preprint.

Reichelt, M., K. Makovi, and A. Sargsyan. 2020. "The impact of COVID-19 on gender inequality in the labor market and gender-role attitudes," *European Societies.*

Relationships Australia. 2020. "COVID-19 and its effects on relationships." Survey report. https://www.relationships.org.au/what-we-do/research/online-survey/MaySurveyResults.pdf

UNFPA. 2020. "Demographic resilience programme for Europe & Central Asia." https://eeca.unfpa.org/en/publications/demographic-resilience-programme-europe-central-asia.

Wagner, B.G., K.H. Choi, and P.N. Cohen. 2020. "Decline in marriage associated with the COVID-19 pandemic in the United States." *SocArXiv* preprint. https://doi.org/10.31235/osf.io/x6ph4.

Wilde, J., W. Chen, and S. Lohmann. 2020. "COVID-19 and the future of US fertility: What can we learn from Google? IZA discussion paper no. 13776.

Xiong, J., O. Lipsitz, F. Nasri, L.M.W. Lui, H. Gill, L. Phan, et al. 2020. "Impact of COVID-19 pandemic on mental health in the general population: A systematic review," *Journal of Affective Disorders* 277: 55–64. https://doi.org/10.1016/j.jad.2020.08.001.

Who Is Doing the Research? The Implications of the Pandemic for Researchers in the Population Sciences

Ann K. Blanc
Sanyukta Mathur
Stephanie R. Psaki

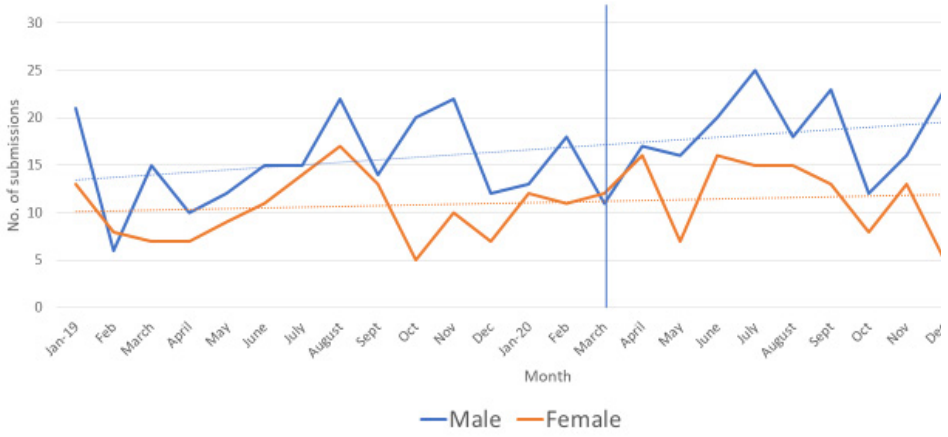
As the global Covid-19 pandemic reaches the one-year mark, its impact on those who carry out research in the population sciences[1] is beginning to be revealed. Even in the first few months of the pandemic, observers began to suggest that the main indicators of research productivity were showing signs 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).

Ann K. Blanc, Sanyukta Mathur, Stephanie Psaki, Population Council (Ann Blanc, formerly Population Council).

https://doi.org/10.31899/pdr1.1002

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 demography[2] (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 stakeholders[4] (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)

References

Amano-Patiño, Noriko, Elisa Faraglia, Chryssi Giannitsarou, and Zeina Hasna. 2020. "Who is doing new research in the time of COVID-19? Not the female economists." In *Publishing and Measuring Success in Economics,* Sebastian Galiani and Ugo Panizza (eds). London: Centre for Economic Policy Research.

Azevedo, J.P., A. Hasan, D. Goldemberg, S.A. Iqbal, and K. Geven. 2020. "Simulating the potential impacts of COVID-19 school closures on schooling and learning outcomes: A set of global estimates." World Bank Group.

Babcock, Linda, Maria P. Recalde, Lise Vesterlund, and Laurie Weingart. 2017. "Gender differences in accepting and receiving requests for tasks with low promotability," *American Economic Review* 107(3): 714–747. doi: 10.1257/aer.20141734.

Bittante, Cristina, Giorgia Beatrice, Lorenza Carletti and Alessandro Mantovani. 2020. "Gender disparity in authorships of manuscripts on the COVID-19 outbreak," *Journal of Public Health.* https://doi.org/10.1007/s10389-020-01323-x

Cui, Ruomeng, Hao Ding, and Feng Zhu. June 9, 2020. "Gender inequality in research productivity during the COVID-19 pandemic," *SSRN.*

Dickerson, Caitlin. April 25, 2020. "My world is shattering": Foreign students stranded by coronavirus." *New York Times.*

Dolan, Kathleen and Jennifer L. Lawless. April 20, 2020. "It takes a submission: Gendered patterns in the pages of AJPS," *American Journal of Political Science.*

Donaldson, Peter. 2011. "Toward an engaged public demography." Occasional Paper. Washington, DC: Population Reference Bureau.

Flaherty, Colleen. April 21, 2020a. "No Room of One's Own," *Inside Higher Ed.*

———. August 20, 2020b. "Something's Got to Give," *Inside Higher Ed.*

Fox, Justin. September 10, 2020. "Covid-19 Interrupts Flow of Foreign Students to U.S.," *Bloomberg Opinion.*

Frederickson, Megan. May 11, 2020. "COVID-19's gendered impact on academic productivity," Github.com.

Gewin, Virginia. July 20, 2020. "The career cost of COVID-19 to female researchers, and how science should respond," *Nature*.

Guarino, Cassandra M. and Victor M.H. Borden. 2017. "Faculty service loads and gender: Are women taking care of the academic family?" *Research in Higher Education* 58(6): 672–694. doi: 10.1007/s11162-017-9454-2.

Hayward, Mark. 2020. https://twitter.com/mdhayward/status/1341036741801730048.

Hur, Hyungjo, Maryam A. Andalib, Julie A. Maurer, Joshua D. Hawley, and Navid Ghaffarzadegan. 2017. "Recent trends in the U.S. behavioral and social sciences research (BSSR) workforce," *PLOS ONE* 12(2): e0170887. doi: 10.1371/journal.pone.0170887.

IUSSP. 2020. "Demographers' contributions to the understanding of the COVID-19 pandemic." https://iussp.org/fr/node/11297.

Kelly, Bridget Turner. 2019. "Though more women are on college campuses, climbing the professor ladder remains a challenge," *Brookings.* Retrieved January 8, 2021. https://www.brookings.edu/blog/brown-center-chalkboard/2019/03/29/though-more-women-are-on-college-campuses-climbing-the-professor-ladder-remains-a-challenge/.

Krapf, Sandra., Michaela Kreyenfeld, and Katharina Wolf. 2016. "Gendered authorship and demographic research: An analysis of 50 years of Demography," *Demography* 53: 1169–1184. https://doi.org/10.1007/s13524-016-0482-x.

Krukowski, Rebecca A., Reshma Jagsi, and Michelle I. Cardel. 2020. "Academic productivity differences by gender and child age in Science, Technology, Engineering, Mathematics, and Medicine faculty during the COVID-19 pandemic," *Journal of Women's Health*. doi: 10.1089/jwh.2020.8710

Kuhfeld, M., B. Tarasawa, A. Johnson, E. Ruzek, and K. Lewis. 2020. "Learning during COVID-19: Initial findings on students' reading and math achievement and growth." NWEA.

Lange, Berit. December 12, 2020. "Maintaining a gendered perspective in scientific meetings during the COVID-19 pandemic," *The Lancet.* Correspondence. 396(10266): 1880.

Menken, Jane, Ann K. Blanc, and Cynthia B. Lloyd. 2002. "Training and Support of Developing-Country Population Scientists: A Panel Report." New York: Population Council.

Mitchell, Sara McLaughlin and Vicki L. Hesli. 2013. "Women don't ask? Women don't say no? Bargaining and service in the political science profession," *PS: Political Science & Politics* 46(02): 355–369. doi: 10.1017/S1049096513000073.

Muric´, Goran, Kristina Lerman, and Emilio Ferrara. June 11, 2020. "COVID-19 amplifies gender disparities in research." arXiv:2006.06142v1 [cs.DL] https://arxiv.org/pdf/2006.06142.pdf

Myers, Kyle R., Wei Yang Tham, Yian Yin, Nina Cohodes, Jerry G. Thursby, Marie C. Thursby, Peter Schiffer, Joseph T. Walsh, Karim R. Lakhani, and Dashun Wang. 2020. "Unequal effects of the COVID-19 pandemic on scientists," *Nature Human Behaviour.* Volume 4: 880–883.

National Academies of Science, Engineering, and Medicine. 2020. "Investigating the Potential Impact of COVID-19 on the Careers of Women in Academic Science, Engineering, and Medicine." Accessed 1/2/2021.

O'Meara, KerryAnn, Alexandra Kuvaeva, Gudrun Nyunt, Chelsea Waugaman, and Rose Jackson. 2017. "Asked more often: Gender differences in faculty workload in research universities and the work interactions that shape them," *American Educational Research Journal* 54(6): 1154–1186. doi: 10.3102/0002831217716767.

Pinho-Gomes, Ana-Catarina, Sanne Peters, Kelly Thompson, Carinna Hockham, Katherine Ripullone, Mark Woodward, and Cheryl Carcel. 2020." Where are the women? Gender inequalities in COVID-19 research authorship," *BMJ Global Health.* http://dx.doi.org/10.1136/bmjgh-2020-002922

Raabe, Isabel J., Alexander Ehlert, David Johann, and Heiko Rauhut. 2020. "Satisfaction of scientists during the COVID-19 pandemic lockdown," *Humanities and Social Sciences Communications.* Vol. 7, Article Number: 139.

Rasul, Imran. 2020. https://twitter.com/ImranRasul3/status/1346722122652127232.

Save Our Future. 2020. "Averting an education catastrophe for the world's children." https://saveourfuture.world/wp-content/uploads/2020/10/Averting-an-Education-Catastrophe-for-the-Worlds-Children_SOF_White-Paper.pdf

Thomas, Emma G., Bamini Jayabalasingham, Tom Collin, Jeroen Geertzen, Chinh Bui, and Francesca Dominici. October 2, 2019. "Gender disparities in invited commentary authorship in 2459 medical journals," *JAMA Network Open*. 2(10): e1913682. doi: 10.1001/jamanetworkopen.2019.13682. PMID: 31642926; PMCID: PMC6820037.

UNESCO. 2020. "Inclusion and education: All means all (Global Education Monitoring Report)."

Viglione, Giuliana. May 20, 2020. "Are women publishing less during the pandemic? Here's what the data say," *Nature*.

Vincent-Lamarre, Philippe, Cassidy R. Sugimoto, and Vincent Larivière. May 19, 2020. "The decline of women's research production during the coronavirus pandemic," *NatureIndex.com*.

White, Corinne, Ngo, Thoai and Paul Hewett. 2020. "In-person research during COVID-19: Considerations and a call to action." https://iaphs.org/in-person-research-during-covid-19-considerations-and-a-call-to-action/.

A Covid Agenda from the Perspective of Adolescent Girls and Young Women

JUDITH BRUCE

IF I HAD BEEN ASKED to write this commentary a year ago (December 2019), I would have offered the same top-line messages about the demographic agenda, focusing on a core constituency for that agenda—adolescent girls and young women in the poorest countries and communities. Applying December 2020 hindsight—no pun intended—these areas of inquiry hold, even though they are selectively amplified and reshaped by Covid. To understand what is unfolding before our eyes requires an unsparing inquiry from a post-Covid perspective. We must track not only traditional impacts, but ask what strategies and programs/projects mitigated negative impacts and promoted positive ones. The needed research can be very roughly sorted into individual, household, and community levels, with considerable overlaps and linkages among the three. Priority for the research investment should be accorded to the populations most excluded and at risk pre-Covid.

The first impact of the pandemic worthy of study is its effect on the female dependency burden—not the conventional age-structure dependency burden, but the already disproportionate share of food and water provisioning, schooling, and physical-care responsibilities falling on females. Is the pandemic intensifying and redefining the burden? And on which females? A high and rising proportion of females can expect to be sole or majority providers for themselves, their children and grandchildren, and their parents and grandparents. Even when males are present and contributing, female income to a far greater extent than male income is "family income." If current patterns hold post-Covid, resources and income under female control will have many times the family impact of comparable income under male control and, therefore, increasing females' economic inclusion should be prioritized.

Girls' exercise of sexual and reproductive rights requires more than information and service access. They, like male peers, must have viable economic choices and an identity independent of sexuality, marriage, and

Judith Bruce, Population Council.

https://doi.org/10.31899/pdr1.1003

childbearing. Key to this is preparation for decent livelihoods, which can be measured by proxies such as completed schooling, mastery of basic financial and digital skills, incubator savings, and the social networks on which livelihoods often depend. Girls' acquisition of such assets promotes deferred marriage and planned fertility; reduces the risk of STIs, including HIV/AIDS; and increases intergenerational investment in children's health and education. How will the dislocations of the pandemic—not only school disruption, but also girls' visible economic response in this emergency—affect girls' self-identification as economic actors in their life-course and reproductive aspirations? And, just as vitally, will there be a public appreciation of their burden and promise, which translates into increased investment in their economic inclusion? In the poorest communities pre-Covid, girls' completion of secondary school was already at risk. During Covid, an all-girls school drawing students from a deprived rural Tanzanian district reported that the majority of the 300 girls returning to school post-confinement had not had the time nor facilities required to complete their "remote" studies. Most had been absorbed in survival caring and provisioning at home and some were sent to work the land (less true of their brothers). A network of school graduate mentors overseeing "girls' clubs" in home communities feared that mentees in the public system, in which post-confinement had extended school by two hours, would be under pressure to drop out given their role backstopping the family survival strategy.

The pandemic may further alter the "shape" of girls' lives, which is markedly different than that of boys. Girls' biological puberty is earlier (approximately age 12) than that of boys; girls' age of socially constructed "puberty" is often even younger in some traditional settings and many "modern" ones—owing to sexualizing norms promoted by social media. Girls' reproductive health, social, and economic trajectories are largely set by age 15. For males, not only is biological puberty later, but its consequences more favorable—their lives are getting better, their mobility greater, their share of everything (including power) increased. Girls' resilience is tested in early adolescence, and few poor girls have an orderly transition to adulthood as per the policy nostrum life course—have adequate food, have vaccinations, enter school, complete school, find employment, select life partner, start a family, remain securely married. The observance of this script is a privilege for both males and females, but far rarer for deprived females. A longitudinal dataset from Malawi revealed that females were ten times more likely than male peers to undergo a major "transition"—leaving school, sexual initiation, marriage, becoming a parent, moving household, etc., between the ages of 16 and 19. We need to study the impacts of the pandemic on events—leaving school, labor and sexual exploitation, household displacement, etc., that have the potential to move girls off-track permanently. And, from a response point of view, what types of programs—and timing beginning at what age—

can prevent the worst outcomes and offer second chances to those who have already fallen behind?

Females' sexual, marriage, and labor markets are already harmfully intertwined and possibly further complicated by Covid conditions. Females' sexual exposure rises in crisis, when sex may be included in the price of survival goods. Displacement/confinement-driven "marriages" increase the risk of unsafe pregnancy, and for many young mothers solo lifetime responsibility for children. Such marriages, even when they provide a temporary sense of protection, may simply defer risk to the young bride. They can be both unstable and unsafe, owing to a lack of meaningful consent, the haste of their conclusion, and mobility pressures on one or both partners to secure work and food. Campaigns to end child marriage in South Asia and sub-Saharan Africa report setbacks under Covid as destitute parents see marrying off a young daughter as an emergency poverty-alleviation response. Research questions include how the countervailing pressures on families to preserve adolescent females' marriageability and family reputation, while also having an urgent need for survival income, are (were) resolved under Covid. What are (were) the results for girls' marriage timing, partner selection, pressure for children, and marital stability?

The lives of the girls and young women central to this commentary are strongly conditioned by household demands. Household size and composition and how the "family" is socially constructed and its rules for allocating labor and food resources are vital information for demographic assessments and the design of relief and recovery efforts. Local meanings of household "headship" must be closely interrogated, lest this role be mechanically assigned to the oldest male, even if he is seldom home and it is the females who are bringing in most resources. When households are entitled to support, whether in kind or cash or access to services, how is it optimally delivered into complex households? Distribution of food during the rehabilitation phase of the Biafran crisis was encumbered by insufficient understanding of who was responsible for feeding whom. Malnourished children were not always the responsibility of their biological mothers, but of the female partners of their fathers. Households readily adapt when stressed by external shocks. In many deprived settings, new shocks—such as Covid—compound and extend old ones. In the Sahel, afflicted by long-term environmental degradation, drought, and endemic conflict, large nominally male-headed compounds are often composed of multiple female-centered families with each female in charge of provisioning her "cooking pot" dependents.

Household power relations can be disrupted by Covid confinement. Men spending more time at home, accompanied by reports of escalating domestic violence, has turned attention to the relations between adult partners—but there are other power relations to investigate. A field report from Kenya relayed a provisional finding of more shared decision-making over resources

under Covid. Perhaps, but plausibly, female partners permit power-sharing to make peace and compensate for lost control by allocating more work to younger females. An interesting question will be how, under Covid confinement conditions, adolescent girls' labor, fertility, sexuality, and claim on food figure into household bargaining between adult partners. To what extent do females shift the burden of provisioning and caregiving among themselves rather than challenge the privilege and leisure of older and younger males?

On a brighter note, it will be worth examining how Covid can (from the strategy and program/project design point of view) or did (from the lessons learned point of view) open up new livelihood opportunities for young females. Covid has increased likely durable demand for locally available, affordable, nutritious food and potable water; primary health care; safer, more comfortable multipurpose homes; low-cost renewable energy, and reliable digital connectivity for work, technical, and in-person learning aids. But, if these new opportunities materialize, can or will they be seized safely? Increasing home-based work in poor settings accommodates childcare and home schooling, but generates little income, can reduce female control over earnings, and may raise tensions with partners. Traditional work in community fields or marketplaces, though not risk-free, is conducted in familiar locations with some protective mechanisms. Post-Covid, better-paid work in modernizing sectors may entail mobility, new personalities, and places to navigate and skills to master—but also incur high safety and sexual risks.

Finally, it is important to study Covid at the community level as crises illuminate and intensify preexisting divisions. Information about community substructures is vital to craft responses that strengthen social cohesion, channels of communication, and competence in delivering core services. Pre-Covid conventional community-engagement strategies, including "youth mobilization," convened forums, curated "dialogues," and delivered resources in ways that tended to reinforce male dominance and formal control over community facilities and grant males preferential access to new technologies. Female leadership (where it existed) was token, and few avenues were provided for the expression of the needs of younger females or poorer households with children.

The learning opportunity—analytic and programmatic—of defining meaningful access to valued resources for different demographic segments cannot be overstated. Neither communities nor girls in the same communities are homogeneous. Rapid Covid responses have assumed sufficient—if not uniform—connectivity to render remote health and schooling support effective. Yet, in urban Ethiopia, girls in domestic service had negligible (and not private) phone access. In contrast, in Mozambique, an adolescent girls initiative with just weeks of experience in a new site had created enough social capital that neighbors lent phones to girls to receive Covid protection instructions and coordinate drop-off of food and hygienic supplies and home-learning lesson plans. In places where girls have more cell phone coverage

they may have enhanced access to protection protocols and remote social support but are also subject to sexual messaging and trafficking.

The delineation of communities into segments may require refinement to see pre- and post-Covid "transitions" more clearly. Standard cohort segmentation may not serve; for example, girls 10 to 14 may be more usefully divided into girls 10 to 12 and 13 to 14 given the demographic significance of puberty and transition to secondary school. In some settings, classifying females not simply by their age but also by the age of the children for which they are responsible might be instructive. Once segmentation has been contextualized, we can explore for each segment what is "their" safe access to core resources (e.g., food security, water, health care), "their" time use, and "their" community of information (how and from whom "they" share information, what information is trusted and actionable). There may be segment-specific mental health impacts of Covid conditions. Psychological traumas may rob the young of their resilience, even when external factors improve. Younger females may be especially subject to depression, withdrawal, and a loss of the confidence needed to resist religious authoritarianism and demeaning gender roles.

That said, and equally worthy of study, there are shining examples in the context of Covid and other emergencies of young female cadres functioning as frontline "social first responders." Female mentors and their adolescent mentees have provided rapid responses to food insecurity, shaped and updated Covid protection messages, met reproductive health needs with privacy, interceded in medical emergencies and domestic violence, assisted community-wide at-home learning through virtual platforms, and delivered in person, when possible, critical goods, even homemade sanitary supplies and emergency entitlements to the most in-need households. The question is, can the knowledge the Covid pandemic revealed about intracommunity inequalities in access and the disruption it brought to traditional community structures be constructively harnessed? Can this experience bolster the commitment to inclusive communities with accountable plans to reach the most vulnerable, actively solicit young female participation, establish permanent female-accessible platforms through which to deliver health information, mental health, social support, as well as vital commodities including contraception, and increase food security, impart livelihood skills, extend connectivity, and build a wider basis of civic engagement—before the next crisis?

Acknowledgments

The author acknowledges the support of colleagues Sophie Soares, Samantha Berg, Kelly Hallman, Annabel Erulkar, Angel del Valle and the Adolescent Girls Community of Practice partners Girl MOVE Academy, Nurturing Minds/SEGA Girls School, Batonga Foundation, Indigenous Adolescent Girls Empowerment Network (IMAGEN), the Population Council's Abriendo Oportunidades and Biruh Tesfa for All projects, and Rima Mourtada and James Phillips for so generously sharing their broad knowledge.

Demographic Contributions to Policymaking during the Pandemic

Sonalde Desai

As demographers look back on 2020, it seems likely that it will be with a greater appreciation for the importance of demographic data in a public health emergency, possibly coupled with some regret at missing an opportunity for making meaningful contributions to public discourse as nations struggled to cope with the pandemic. I hope this regret will translate into energizing our field to reshape the way we go about our business.

Paul Demeny (1988), in an article published in Population and Development Review, commented that demography as a discipline has long been uneasy trying to balance its role as producer of knowledge with seeing this knowledge applied in service of public policy. As we speculate about the impact of Covid-19 on the future of our discipline, it is much easier to think about how it may change our repertoire of research topics and methodologies than to reflect on whether the way our field has organized itself was conducive to public service during these difficult times.

The most significant impact of Covid-19 on demography is likely to be in the arena of data collection. Mortality data, particularly age- and cause-specific mortality data, were invaluable in estimating the seriousness of Covid-19. As the pandemic's course progressed and concerns about economic impacts began to dominate, most countries adopted more sophisticated approaches to targeting vulnerable populations. Areas in which Covid positivity rates exceeded a certain threshold were locked down; individuals in some areas and some occupations were offered social protection benefits; businesses and modes of travel with greater disease transmission possibilities were not allowed to operate; individuals with certain health conditions were prioritized for testing and now vaccination. Demographic data were widely used to aid in this decision-making, justifying the costs and effort involved in collecting these data and setting the stage for future investments in data collection.

Sonalde Desai, Department of Sociology, University of Maryland and National Council of Applied Economic Research, New Delhi.

https://doi.org/10.31899/pdr1.1004

The Indian government was surprised when, immediately following the lockdown, thousands of migrants from metropolitan cities began walking back to their hometowns, carrying the disease with them. As the government started looking for data on the number of rural migrants living in urban areas and their communities of origin and destination, it was discovered that migration data in India are minimal. It would be surprising if, in a post-pandemic world, data collection in India does not emphasize collecting more information about migrants and their living conditions. Similarly, given the greater vulnerability of individuals with preexisting health conditions to SAR-CoV-2, most countries have recognized the need for collecting information about disease prevalence. This interest in disease prevalence may well translate into a greater emphasis on collecting biomarkers, increasingly a staple of demographic surveys.

While the need for data has been high during the pandemic, collecting new data has been very difficult. As a result, investments in diverse research methodologies, particularly those that do not require face-to-face contact, have grown. While telephone surveys have emerged as a method of choice, web-based surveys and other modes of data collection such as GPS location-based surveys of social interaction are beginning to play an important role in providing data. The multinational Facebook Covid Symptom Study, with millions of participants, provides an exciting example. Over the coming decade, data collected through these nontraditional sources will be subjected to greater scrutiny for reliability and representativeness, setting off a minor industry.

If the pandemic is likely to offer an increased emphasis on what Kreager (2015, p. S34) terms "Demography in Service of the State" through its data-collection arm, self-reflexive demographers might wonder whether demographic contributions to the public discourse, beyond the data we collect, lived up to its mark.

The pandemic highlighted topics that fall squarely within our domain—population mobility and social interaction; age, gender, and social class-specific prevalence of health risks such as cardiovascular conditions and diabetes; labor-force participation and nature of work; poverty and economic vulnerability. While many disciplines address one of these topics, the multidisciplinary nature of demography created a potential for us to integrate all of these considerations, thereby offering powerful tools for policy analysis that can be made locally specific. Sadly, this integration did not take place because it required different disciplines to work together. Although demography is multidisciplinary in its organization, true interdisciplinarity is harder to achieve, which may have limited demography's contributions to public policy at this critical time.

Demographic research through decades, most recently reflected in work by Case and Deaton (2020), shows that poverty is a leading cause of disease

and death. If lockdowns minimize the spread of the pandemic and reduce income, should we not have tried to integrate considerations of health and mortality impacts of poverty and unemployment in our decision matrix through a feedback loop? Epidemiological models were remarkably silent about this feedback.

Social assistance benefits offered during the pandemic have been mostly agnostic regarding what demographers know about life-cycle forces that push people in and out of poverty and how they vary across countries. For example, demographic studies have consistently highlighted the vulnerability of single-parent families to external shocks. Single parents deprived of childcare may be more likely to fall into poverty. Occupational sex segregation often results in a disproportionate concentration of women in hospitality and retail sales. Thus, demographic insights would suggest that mother-headed families are more likely to be vulnerable to the pandemic's economic shocks. However, these insights have not been incorporated into the design and delivery of safety nets in the context of the pandemic.

How do we explain this exclusion of demographic insights from the policy discourse? Paul Demeny argued, "social science research directed to the developing countries in the field of population has now become almost exclusively harnessed to serve the narrowly conceived short-term interests of programs that embody existing orthodoxy in international population policy. In such a role, the contributions of research to social betterment are at best marginal" (Demeny 1988, p. 472).

Demeny's words, written over three decades ago, were surprisingly prescient. As of December 2020, the webpage on Covid-19 at the website of the International Union for the Scientific Study of the Population (IUSSP 2021) shows a substantial number of articles on the use of demographic data in estimating Covid-related mortality and a few items on the potentially negative impact of the pandemic on women. Yet, issues that have preoccupied governments worldwide as they seek to regulate movement across national and subnational boundaries, grapple with appropriate timing for imposing and reducing restrictions on economic activities, and provide subsidies, income transfers, and food aid to their populations are remarkable in their absence from this page.

I fully anticipate that this omission will be redressed in decades to come. Demographers will focus on the natural experiment that the pandemic offers to look at the impact of this year out of time on different cohorts and different life-cycle events. Researchers will focus on a range of topics such as comparison of learning outcomes between children experiencing distance education in primary school compared to that in secondary school, the impact of entering the labor market in 2020 vis-à-vis in earlier years, differential gendered impact of school closure on men and women, and, long-term health implications of being infected by SARS-CoV-2. Nonetheless, our inability to

integrate what we already know into evidence-based policy design has been limited, possibly because of the way our discipline is organized.

I hope that the field will reflect on these missed opportunities for contributing to the public good when our inputs were most needed. Demographers have great potential for engaging the world of policymaking, and not all of it is limited to family planning programs or maternal and child health. However, to contribute to diverse discourses, we need to see ourselves as full partners and contributors to public policy and not merely as producers of data consumed by others.

It would be a mistake to attribute the absence of demographers from policy responses surrounding the pandemic only to the disjunction between academic researchers and policy mavericks. Academic economists were actively engaged in grappling with the policy challenges presented by the pandemic, as a thoughtful statement by academic economists at the International Growth Centre (IGC) demonstrates (IGC 2020), making the omission of demographic insights from these responses even more puzzling.

How do we explain the muted nature of demography's response to the crisis? Perhaps answers to this puzzle lie in an article by Alberto Palloni articulating the DNA of the discipline. Palloni (2002, p. 36) termed demography a dependent discipline, noting "Research practice of demography is characterized by heavy incursions from outside…demographers are sophisticated consumers of theoretical products elaborated elsewhere.…This is not an ideal set of conditions to generate accepted claims of scientific territory, academic assertiveness, or self-assurance even within nonacademic professional environments."

The multidisciplinary nature of demography masks our lack of assertiveness. Economists, sociologists, anthropologists, and political scientists attend the annual meeting of Population Association of America (PAA). Many scholars from these disciplines publish in demographic journals and demographers build on insights from these fields in their own work. Nonetheless, the core enterprise of demography remains isolated from these adjacent disciplines and demographers rarely make assertive statements about policy formulation outside of what we consider our traditional areas of expertise such as family planning and health policy. Lack of demographic inputs in the design of social policies in the wake of the pandemic was particularly jarring and became obvious only when policies failed or problems emerged, such as the plight of stranded migrants.

I hope that in years to come, demographers will adopt a more assertive stance when it comes to public policies and engage in genuinely interdisciplinary research and dialogue. Disciplinary training in neighboring disciplines like economics, political science, and sociology will be the norm and politics of policymaking. The role of evidence and data in this enterprise will become a required course in demographic training. This will allow demographic

knowledge to be integrated in public policy domains hitherto reserved for other disciplines such as economic development or social protection policies. Most importantly, we will begin to enlarge areas we see as squarely within the domain of demography in our research and data collection, returning us to our roots in political arithmetic.

References

Case, A. and A. Deaton. 2020. Deaths of Despair and the Future of Capitalism. Princeton, NJ: Princeton University Press.

Demeny, P. 1988. "Social science and population policy," P*opulation and Development Review* 14(3): 451–479.

International Growth Centre (IGC). 2020. "IGC COVID-19 guidance note: Containment strategies and support for vulnerable households." Retrieved from https://www.theigc.org/publication/covid-19-guidance/ on January 4, 2020.

International Union for the Scientific Study of Population (IUSSP). 2021. "Demographers' contributions to the understanding of the COVID-19 pandemic." Retrieved from https://iussp.org/fr/node/11297 on January 4, 2020.

Kreager, P. 2015. "Population theory: A long view," *Population Studies* 69: S29–S37.

Palloni, A. 2002. "Rethinking the teaching of demography: New challenges and opportunities," *Genus* 58(3/4): 35–70.

What Demographers Need—and What the World Needs from Demographers—in Response to Covid-19

Jessica Y. Ho

Charged with the task of providing an assessment of how Covid-19 will shape global demographic research needs over the next five to ten years, my mind immediately turned to the question of what demographers will need to carry out their research: data. We demographers are a data-hungry group—we would like more data, of the highest-quality possible, as soon as possible, and as widely available and accessible as possible.

The pandemic has underscored the pressing need to invest in and maintain the quality and integrity of our essential sources of demographic data around the world. In far too much of the world, and especially in low- and middle-income countries, we still lack high-quality vital registration systems. For example, Indonesia—currently the fourth most populous nation in the world—does not have a vital registration system with complete coverage of the population. Covid-19 has focused the public's attention on the importance of these systems, and it has exerted demands on these systems that they have often been unable to meet, to the great detriment of our understanding of and ability to develop informed responses to the pandemic. It is critical that this acute recognition of how important these vital registration systems are to our understanding of population health, processes, and dynamics is not short-lived.

Of course, data issues are not restricted to developing countries. High-income countries with longstanding vital registration systems have also struggled to provide adequate information to assess the dimensions and impacts of the pandemic. In the United States, there has been a lamentable paucity of data by race/ethnicity and at finer geographic levels available to researchers and to the public. These limitations, along with the slow release of these data, have greatly hampered our ability to derive precise estimates of the pandemic's outsized impact on disadvantaged populations and to compare

Jessica Y. Ho, Leonard Davis School of Gerontology and Department of Sociology, University of Southern California.

https://doi.org/10.31899/pdr1.1006

how we are faring relative to other countries. The lack of subgroup- and area-level data and the lags in reporting have contributed to mistaken assumptions about the pandemic, including the belief that children, suburbs, and rural areas would be unaffected.

It is also important to recognize that, even before Covid-19, we lacked timely mortality data in many high-income countries. On average, the lag between the current year and the most recent year for which data are available is roughly one to three years for all-cause mortality and two to five years for data by cause of death. This substantial lag hampers our ability to identify and study contemporary demographic trends. Covid-19 has revealed how dangerous this lack of timely information can be when facing a new and fast-developing threat. It also means that we are years behind in discovering other important phenomena including life expectancy declines, stalled progress in reducing cardiovascular disease mortality, and the direction of the contemporary American drug overdose epidemic.

Around the world, data are being delayed, distorted, and marshaled in support of political agenda precisely because they are so valuable. We have witnessed a tug of war around hospital data once routinely reported to the Centers for Disease Control and Prevention and unprecedented challenges in fielding the 2020 Census in the United States. Our data collection systems for births, deaths, and migration are too important—too vital, as their name suggests—to be subverted by political interference and underinvestment. We must also strike the right balance between providing sufficient information to assess the health of populations and the privacy of deceased individuals.

While this may seem like a difficult charge, it is not an impossible one. Central banks provide one potential model of both independent and timely data releases. There is a longstanding tradition in Western democracies of central banks maintaining independence in setting monetary policy and in the collection and dissemination of data. Economic data are prioritized to the point where they regularly have monthly, if not weekly, releases. Surely our demographic data are equally as important. Given the extent of recent political interference in the collection and dissemination of demographic data, demographers should advocate for a similar degree of independence for our statistical agencies to safeguard demographic data. In short, we must find a way to establish and sustain robust vital registration systems and censuses around the world that provide timely data and that are resilient to a wide array of crises and challenges. Ensuring the independence of data collection systems and protecting them from partisan manipulation are integral parts of this task.

As a scholar of health and mortality who is based in the United States but often conducts comparative research, my wish list for data is extensive. Thinking about studying the diverse impacts of Covid-19, my thoughts quickly jump to, "Wouldn't it be wonderful if every country in the world had

a large longitudinal survey that was nationally representative, covered the entire age range, fielded an extensive battery of questions about demographic and socioeconomic characteristics, and also collected a comprehensive panel of biomarkers? Oh, if the response rates were well above 90 percent and the data were publicly accessible, that would be the cherry on top." Sadly, we are far from this ideal scenario.

It is worthwhile to ask, "What would the perfect data be?" However, demographers have always been acutely aware of data needs and the shortfalls of reality. In response, they have developed a flexible methodological toolkit, a strong comparative advantage in working with scarce data, and a keen understanding of the minimum requirements needed to arrive at meaningful conclusions about population processes. I am confident that at this moment, demographers are working on developing or adapting indirect estimation methods for measuring Covid-19's impact in countries without robust vital registration systems.

What else will demographers be studying in the coming years, and what does the world need from demographers? Demographers are uniquely well-positioned to make the case for the population perspective. It is increasingly common to focus on the individual determinants of health and other outcomes. Many of the open questions that have been posed about Covid-19 and its impacts operate at the individual level. For example, what will the long-run health consequences be for young adults who contract Covid-19 today? Individual determinants certainly matter, but we should not lose sight of key factors operating at other levels. It is clear that individuals are situated within families, neighborhoods, communities, localities, and countries. The pandemic has underscored the fact that where people live and how those in power have handled the pandemic affect how much exposure individuals will have to the pandemic and its social and economic impacts.

At the time of this writing, the United States has had roughly 20.7 million Covid-19 cases and about 352,000 deaths. Taiwan, whose population is roughly the size of Australia's, has had about 815 cases and 7 deaths. Glimpses of life in countries like South Korea, New Zealand, and Singapore have seemed unimaginably different from life in the United States during the pandemic. All around the world, countries have their share of racial/ethnic and religious minorities and people who have indigenous ancestry, are obese, are of low socioeconomic status, or are immunocompromised. All else being equal, more advantaged groups tend to have better health. But all else is not equal. The likelihood that a given individual in the global population contracts and/or dies from Covid-19 has much to do with their country's national-level response to the pandemic. A poor person in a high-income country with poor handling of the pandemic may have an astronomically higher risk of exposure to Covid-19 than a poor person in a lower-income country that has implemented an effective response. It is important to understand the individual

characteristics that put people at risk of dying from Covid-19. It is equally important to understand the factors that have safeguarded the health and well-being of entire national populations. Even if some of these conditions cannot be replicated in other contexts, if we don't ask the right questions, we won't get complete answers.

I believe the field of demography has many important contributions to make, and I hope it will play to its strengths in the coming years. We need to have confidence that we are working with the right figures and the right measures. Demographers have an essential role in helping the public better understand and interpret the statistics being thrown at us in our data-driven world.

Assessing the Demographic Consequences of the Covid-19 Pandemic

Emily Klancher Merchant

Demographers and other social scientists have long recognized that so-called natural disasters are always also social and political. While extreme weather events, earthquakes, famines, and pandemics may originate in nature, their effects are always structured by existing social inequities and by political responses. In the Anthropocene—our current geological epoch, in which biogeochemical change is primarily driven by human activities—it has become clear that even the origins of such disasters are not entirely natural. Natural disasters are typically localized in space, usually within countries, foreclosing the possibility of comparative analysis. As a global pandemic, however, the Covid-19 event affords demographers an unusual research opportunity. As demographers investigate the demographic consequences of the pandemic in the regions with which they are most familiar, they should also collaborate on comparative analysis to determine how social inequities and political responses in various parts of the world mediated between a global disease and its local demographic effects.

The Covid-19 pandemic has by now had an unmistakable impact on each of the core demographic processes—mortality, fertility, and migration—in all parts of the world. It has also affected the collection of demographic data. This essay describes some of the demographic consequences in the United States in order to point to opportunities for comparison with other parts of the world. To investigate these consequences, demographers will need data and methods with which to measure the short- and long-term effects of the Covid-19 pandemic on fertility, mortality, and migration, taking into account global disease processes, local social structures, and political responses at the level of public health institutions. (In many countries, this is the national level, but, in the United States, it has typically been the state or county level.) Such comparative research will not only help us better understand why Covid-19 had the demographic consequences it had (and will continue to have) in each part of the world, but may also point to ways we can make societies

Emily Klancher Merchant, Science and Technology Studies, University of California Davis.

https://doi.org/10.31899/pdr1.1007

around the world more resilient in the face of future disasters that may not be individually predictable, but are sure to come in one form or another, particularly as the pace of climate change increases.

Mortality

Perhaps the most obvious demographic consequence of the Covid-19 pandemic has been an increase in mortality, both from the disease caused by the SARS-COV2 virus and from the secondary effects of the virus on health systems and economies. According to the Johns Hopkins University Coronavirus Resource Center, more than 1.8 million people worldwide have died from Covid-19 at the time of this writing, with over 350,000 deaths—approximately 19 percent of the total—occurring in the United States. While the early rhetoric surrounding Covid-19 maintained that the disease does not discriminate, it quickly became clear that not everyone is equally susceptible. People who are unable to isolate are at greater risk of contracting the disease, while those who are older or carry a heavier burden of preexisting conditions and comorbidities are less likely to survive it. In the United States, these categories intersect with one another and with the categories that structure social inequality, in this case race and socioeconomic status. Poor and nonwhite Americans are less likely to be able to isolate—due to service-sector and factory jobs, jobs that do not offer paid (or sometimes even unpaid) sick time, and household crowding—and are more likely to carry comorbidities as a result of living in food deserts, the inequitable siting of environmental hazards, and stark inequalities in access to health care. In other countries, different histories of social inequality will likely structure mortality in different ways. Also critical is the public health response to the pandemic, which was abrupt and highly effective in many parts of Asia (including Australia and New Zealand), somewhat less so in Europe, and truly deplorable in the United States and some parts of Latin America. Comparative research on the short- and long-term mortality consequences of Covid-19 will need to tease the effects of the disease itself apart from the underlying social conditions that made some people more susceptible to it and from the political and public health response.

Fertility

In contrast to the mortality consequences of Covid-19, which became apparent very early on and have been diligently tracked by a number of agencies, it may take several years to fully understand and account for the fertility consequences. These studies, too, will need to examine the results of the disease itself, such as the potential effects of Covid-19 on sperm production; underlying social inequities, such as existing risks of maternal and perinatal

mortality, which may have been exacerbated by the pandemic; and policy responses that may shape future childbearing decisions through the distribution of the burden of childcare. In the United States, the immediate effects of Covid-19 on fertility operated through those who were pregnant when the pandemic began and those who were in the process of trying to conceive with the help of various assisted reproductive technologies (ART). Among those who were pregnant when the pandemic began, the same women who already face higher risks of maternal and perinatal mortality—poor women and especially black women and Latinas—also faced a higher risk of contracting Covid-19. Those who were trying to conceive using ART had to pause this process while health systems retooled to focus on treating Covid-19. As the pandemic wore on, however, fertility clinics reopened, and many people renewed their efforts to conceive.

In the long run, policy responses to the pandemic will also affect fertility through the future childbearing decisions of individuals and couples. In the United States, the pandemic demonstrated that, even at the best of times, most families get by only through a delicate balancing act, piecing together the inadequate and largely unregulated childcare resources that are available to those who can afford them. When the pandemic shut down schools and day care centers in March, it was largely mothers who put their careers on hold to take care of young children and to help older children navigate their classes on Zoom. This is not a natural response to the pandemic, but rather one overdetermined by a long history of gender discrimination in the labor force and an absence of policies to support working mothers and dual-career families. Indeed, the same factors that have kept fertility lower in countries like Italy and Japan, where mothers are primarily responsible for childcare, than in countries like Sweden, where there is more public support for dual-career families, will also determine the long-term fertility consequences of Covid-19.

Migration

The migration consequences of the Covid-19 pandemic will also need to be evaluated in both the short- and long-term. When it became clear that the SARS-COV2 virus was going to cause a pandemic, countries around the world began to limit travel and close borders. As a result, many international sojourners returned to their countries of origin, while others decided to remain abroad for the duration. An unexpected consequence was that, as workers abroad were prevented from returning home due to travel restrictions, the migrant smuggling business developed a sideline of smuggling people back home. As universities scrambled to shift classes online, many also closed their dormitories, sending students home to various parts of the world. These relocations are likely to be relatively short-lived. Most universities and college

students are anxiously awaiting a return to campus life, and restrictions on travel will undoubtedly ease when a vaccine or effective treatments become available. The increase in remote work, however, may have a longer-term impact on migration. Now that it has become apparent that many jobs can be done remotely, some large employers have begun to reevaluate their work-from-home or telecommuting policies, and smaller employers are likely to follow suit. An increase in opportunities to work remotely will also afford some people—those with jobs that can be done remotely—a broader set of choices over where to live that could dramatically reshape social geographies. An impressive number of countries, ranging from Antigua to Georgia, are offering one-year renewable remote work visas to "digital nomads" who can demonstrate income and health insurance and afford to pay a fairly modest fee. Demographers will need to investigate the determinants of migration when some people are no longer geographically bound by their jobs, and should examine how the extreme mobility of some workers—typically those with jobs that pay more and offer better benefits—affects the fortunes of immobile workers, such as those in service industries that rely on proximity to their clientele. As with mortality and fertility, the migration consequences of the Covid-19 pandemic and the shift to remote work will be shaped primarily by underlying social structures and public policies.

Demographic Data

In addition to its effects on mortality, fertility, and migration rates and patterns, the Covid-19 pandemic has also had consequences for the collection of demographic data. This has been most apparent in the United States, where the in-person enumeration of households that did not return their 2020 Census form by mail or respond online was first delayed by the pandemic and then curtailed prematurely by the Trump administration, likely leading to an unnecessarily high rate of undercounting. Under ordinary circumstances, it is relatively straightforward for demographers to determine who was missed by a census. However, the enormous demographic upheavals generated by the Covid-19 pandemic will likely make this task more difficult. One particular challenge stems from the fact that many of the people who are most vulnerable to undercounting—the poor and non-White, as well as non-English-speakers—are also particularly vulnerable to Covid-19 mortality. Another stems from the fact that most U.S. universities closed in March, scattering students across the country and the world right before the Census. The American media has paid particular attention to the 2020 U.S. Census because of the controversies that had already surrounded it—most notably the citizenship question—and because of the political consequences of undercounting. However, the United States is not alone in the impact the Covid-19 pandemic has had on its census. Since 1950, the United Nations has

encouraged all countries of the world to take censuses in or near years ending in zero, so many countries have had to manage enumeration in the midst of the pandemic. While a few countries—such as Mexico and Mongolia—completed their data collection early in the year, most have had to suspend or delay enumeration, or substitute data from population registers or other administrative records. The pandemic will, therefore, have a larger effect on demographic data collection in countries that lack adequate administrative records and communication infrastructures that would facilitate enumeration by mail, telephone, or Internet rather than in person.

As a global pandemic unfolding simultaneously across the world, the Covid-19 episode affords unique opportunities for comparative research on all of the basic demographic processes. Such research may be able to determine the specific contributions of the disease itself, underlying social inequities, and policy responses to changes in mortality, fertility, migration, and census-taking. Understanding these natural, social, and political factors will be critical to evaluating vulnerability to future natural (and not-so-natural) disasters, and to promoting resilience.

Rethinking the Role of Demographers in Times of Crisis

THOAI D. NGO
STEPHANIE R. PSAKI

CRISES HAVE A WAY of casting light on systemic failures in our society that, although not new, were previously overlooked by those who were not directly affected. The speed with which SARS-CoV-2 has spread across the globe, leading to nearly 90 million confirmed cases of Covid-19 and 2.0 million deaths to date (Dong et al. 2020), along with devastating economic effects for millions, was largely unfathomable a year ago, even within the global health community.

Many had warned of the threat that zoonoses pose to human populations (Lederberg 1988), and recent outbreaks, including from the Zika and Ebola viruses as well as previous coronaviruses, should have served as glaring warnings. The scale of damage from Covid-19 in many countries is also perhaps not surprising, given the lack of sufficient social safety nets to protect marginalized groups. In the United States, entrenched systems of oppression and racism reinforce social and economic disparities. These include the lack of health insurance, paid leave, affordable childcare, unemployment insurance for many, and quality housing and education, which, in turn, exacerbate health outcomes among poor communities and people of color (Ngo 2020).

That is to say, in many ways this pandemic should not be a surprise, and as demographers—many with expertise in health—we should have been more prepared to respond. Some scientific disciplines have initiated swift and effective responses. Most impressively, multiple SARS-CoV-2 vaccines with high levels of efficacy have been developed in less than a year and rollout has begun. This represents a dramatic—and previously unthinkable—advance in the field of vaccine development, due in part to unprecedented collaboration. But the response from many demographers—trained in the distribution and movement of populations, a perspective that is critical to understanding disease spread—has been slow. While the Covid-19 crisis is particularly acute, it is not the only area where our discipline has been slow to respond.

Thoai D. Ngo, Stephanie R. Psaki, Population Council.

https://doi.org/10.31899/pdr1.1005

The world has changed rapidly in recent decades, and this moment calls on demographers to ask how we can evolve with it.

While there will undoubtedly be discussions in the coming years about new topics of focus for demographers, we propose several opportunities to change how we do our work to improve our ability to shape social and health policies while being prepared to respond to the repercussions of the Covid-19 pandemic and future crises.

1. *Promote research transparency and improve efficiency.* During the Covid-19 pandemic, we have witnessed widespread disinformation and growing distrust for science, especially in the United States, stemming from the growing politicization of science and medical guidance. Moving forward, scientists across diverse disciplines must come together to counter this growing distrust through greater transparency. Scientists engaged in Covid-19 research have begun this process by sharing protocols for vaccine trials publicly (Doshi 2020), as well preprints of new research (Dan et al. 2020) and datasets providing information on SARS-CoV-2 and Covid-19 (Abuya et al. 2020), cultivating trust and supporting more rapid innovation in the field. Sharing our work more transparently (including data, code, and protocols) and making better use of existing data will also allow scientists to conduct critical research through a multisectoral lens and will support better collaboration across disciplines. For example, researchers who study health and poverty in urban slums can collaborate with infectious disease modelers to study contact patterns and SARS-CoV-2 transmission risks by demographic factors, including socioeconomic status (Quaife et al. 2020). Since in-person research activities have been halted or minimized in many settings due to physical distancing policies, and remote data collection comes with many methodological challenges, sharing datasets will also allow early career researchers to continue building their skills and contributions to the field.

2. *Collaborate across disciplines.* There are many perspectives that demographic research can offer to better understand the effects of the pandemic, anticipate risks to certain groups, and forecast needs and challenges as we rebuild. For example, social demography can be used to examine the broader social effects of Covid-19, such as on time use within households, and decisions about child marriage. Demographic modeling can predict the indirect impacts of Covid-19, including physical distancing and school closures, on the future, on issues such as migration, fertility, education, marriage, family composition, and income. These questions will be answered most effectively if demographers proactively foster collaborations within our field and form strategic ongoing partnerships between public health researchers, epidemiologists, economists, and others. As part of these collaborations, demographers

can link different types of data to traditional population-based surveys, such as social media, spatial, and administrative data.

3. *Invest in global collaborating research centers anchored by cohort studies.* Ongoing community-based cohort studies offer enormous value to the demographic research field but are expensive to build and maintain. In addition to supporting collaboration across disciplines, these sites should be locally led while harnessing expertise from across the globe. Such cohorts can be used as disease surveillance systems, allowing researchers to study population movements and dynamics, examine rising social movements, and anticipate growing risks. When an outbreak occurs, scientists can easily pivot to study disease transmission, assess the health, social, and economic effects, and model the potential consequences in the larger population. These ongoing collaborative cohorts can serve as "labs" for the development of innovative solutions, including pharmaceutical as well as economic and behavioral interventions. The Rakai Community Cohort Study in Uganda (Rakai Health Sciences Program 2020), established in 1988 in response to the HIV pandemic, has been a research "lab" that produces important social and clinical innovations. If done properly, this model would save time and resources needed to establish study populations when a crisis occurs.

4. *Collect data that accurately represent the challenges facing overlooked populations.* Large-scale surveys, such as the Demographic and Health Surveys (DHS 2020), are nationally representative and play an invaluable role for demographers and public health researchers alike. But national surveys are rarely able to capture the conditions and characteristics of important subgroups such as indigenous populations, migrants, racial/ethnic minorities, or gender minority groups in a specific geographic area. SARS-CoV-2 infects and kills these groups at higher rates (CDC 2020) and they often bear the biggest social and economic burden due to systematic marginalization. If surveys fail to include them, we will be perpetually ill-equipped to respond to these challenges. Similarly, urban centers are growing and becoming more complex. We will need to change the way we collect and analyze data to adequately capture the experiences of populations living in different neighborhoods within urban areas in order to advocate for more inclusive policies and interventions.

5. *Find ways to quickly and effectively communicate findings with decision-makers.* A crisis like the Covid-19 pandemic underscores how essential it is to synthesize and share evidence with decision-makers swiftly and rigorously—this entire pandemic has played out more quickly than it takes to publish most peer-reviewed papers. The peer-review process

> plays an essential—although not foolproof—role in ensuring that evidence is vetted, and research methods are shared transparently. And, importantly in the midst of a crisis, the detailed methodologies shared through scientific publications allow researchers to build off one another's work. Researchers have shared preprints of papers, and many academic journals have committed to fast-tracking the publication of Covid-19-related findings, but we also need to push ourselves to find new and innovative ways of sharing findings in real time. Populations around the world are facing numerous other challenges, including climate change, urbanization, and social unrest. There is no perfect research study, even with ample time, and taking a Bayesian approach to "updating our priors" with rapidly evolving data may be more relevant and useful in times of crisis. There is often a trade-off between speed and accuracy, and research transparency should help.

This crisis presents demographers with an opportunity to ask important questions about the future of this field. What is the role of demographers in this moment? And how can that role evolve to provide relevant real-time guidance to decision-makers? The Covid-19 pandemic has both exacerbated and shed light on deep inequalities and failures in our system. As we look to the future, many have expressed the hope that we can rethink our systems to "build back better." In the same way, this global crisis has tested the ability of demographers to use their skills in support of better population health. We now have the opportunity to reflect on how we might strengthen our field to better respond to future crises.

References

Abuya, Timothy, Karen Austrian, Adan Isaac, Beth Kangwana, Faith Mbushi, Eva Muluve, Daniel Mwanga, et al. 2020. "Experiences among adults and adolescents during the COVID-19 pandemic from four locations across Kenya," Harvard Dataverse. https://doi.org/10.7910/DVN/VO7SUO.

Centers for Disease Control and Prevention (CDC). 2020. "COVID-19 hospitalization and death by race/ethnicity." November 30, 2020. https://www.cdc.gov/coronavirus/2019-ncov/covid-data/investigations-discovery/hospitalization-death-by-race-ethnicity.html.

Dan, Jennifer M., Jose Mateus, Yu Kato, Kathryn M. Hastie, Esther Dawen Yu, Caterina E. Faliti, Alba Grifoni, Sydney I. Ramirez, et al. 2020. "Immunological memory to SARS-CoV-2 assessed for up to eight months after infection," *BioRxiv*, November 16, 2020. https://doi.org/10.1101/2020.11.15.383323.

DHS Program-Demographic and Health Surveys (DHS). 2020. "DHS Overview." Accessed December 1, 2020. https://www.dhsprogram.com/methodology/Survey-Types/DHS.cfm.

Dong, Ensheng, Hongru Du, and Lauren Gardner. 2020. "An interactive web-based dashboard to track COVID-19 in real time," *The Lancet Infectious Diseases* 20(5): 533–534. doi: 10.1016/S1473-3099(20)30120–1. (Last accessed January 7, 2021)

Doshi, Peter. 2020. "Covid-19 vaccine trial protocols released," *BMJ* 371. October 21, 2020. https://doi.org/10.1136/bmj.m4058.

Lederberg, Joshua. 1988. "Medical science, infectious disease, and the unity of humankind," *JAMA* 260, No. 5: 684–85. August 5, 1988. https://doi.org/10.1001/jama.1988.03410050104039.

Ngo, Thoai D. 2020. "We need a pro-poor and pro-black response to COVID-19," Think Global Health (blog). June 10, 2020. https://www.thinkglobalhealth.org/article/we-need-pro-poor-and-pro-black-response-covid-19.

Quaife, Matthew, Kevin van Zandvoort, Amy Gimma, Kashvi Shah, Nicky McCreesh, Kiesha Prem, Edwine Barasa, et al. 2020. "The impact of COVID-19 control measures on social contacts and transmission in Kenyan informal settlements," *MedRxiv*. June 7, 2020. https://doi.org/10.1101/2020.06.06.20122689.

Rakai Health Sciences Program. 2020. "Rakai Community Cohort Study–RCCS." Accessed December 1, 2020. https://www.rhsp.org/research/rccs/rccs-overview.

Covid-19 Aftermath and Population Science's Research Agenda

Alberto Palloni

There are many domains where the Covid-19 pandemic will leave deep footprints on the world's populations. Albeit with unequal degree of detail, I consider three of these domains: infancy and early childhood, the elderly, and the "sandwich generation" of young adults. I assess the possible demographic impacts of the pandemic, identify key problems, and propose research questions and materials that may improve understanding of those impacts and contribute to designing interventions to attenuate the damage on future generations.

Mothers, Children, Covid-19, and the Health and Well-being of Adults for the Rest of the Twenty-First Century

Assessments of the potential long-term impact of Covid-19 on individuals who will become older adults 50 to 60 years from now should consider several types of exposures: parents about to conceive, embryos soon after zygote formation and implantation, fetuses during uterine life, infants breastfed during the pandemic, and young children whose physical and cognitive development is entirely dependent on parental resources, preferences, and behaviors. The delayed manifestation of exposure to Covid-19 will be a function of when during these windows of time the exposure took place, its intensity, and its duration.

We know that, as a consequence of multiple interventions designed to arrest transmission of the virus, virtually all affected populations experienced at some point irregularities in food supply, sharp rises in unemployment, decreases in household income, increased isolation and multiplication of stressful conditions, and weakened access to health care. We also know that these conditions were not shared equally, either within borders or internationally:

Alberto Palloni, Center for Demography and Ecology, University of Wisconsin-Madison, IGED, Consejo Superior de Investigaciones Cientificas (CSIC), Madrid, Spain.

https://doi.org/10.31899/pdr1.1008

poor, marginalized, vulnerable populations are everywhere disproportionately affected, and these account for a higher share of population in low- and middle-income countries than in high-income countries.

There are three main pathways from exposures to Covid-19 pandemic conditions and delayed effects on offspring. The first is via nutritional constraints, the second is a function of parental stress, and the third depends on the direct impact of the virus on pregnant mothers or mothers who deliver during the pandemic. As to the first, despite short-term policy interventions, the decline in household income induced by prolonged unemployment and disruption of livelihoods will become a lingering feature of the pandemic, particularly among poor and marginalized populations in all countries. Deficiencies in paternal and maternal nutritional status (poor caloric intake and a nutrient-deficient diet) right before and during pregnancy impair fetal growth and derail early development via a combination of responses, some with immediate and some with delayed effects. Poor maternal health status can perturb the normal course of a pregnancy and complicate delivery, and maternal viral infections during pregnancy may compromise fetal development. Quality and length of breastfeeding depend on maternal nutrition and maternal stress. Also, unlike in-utero growth, mother-infant feeding is not mediated by barriers, so poor maternal diet directly exposes the child to risks that may have immediate and long-term effects. Empirical evidence from animal studies suggests that maternal depression and stress during some stages of pregnancy promote changes similar to those associated with deficient maternal diets. Further, it is known that postnatal parental stress leads to offspring depression and a heightened stress response, which has been associated with hypertension, cardiovascular disease, obesity, and metabolic disorders.

These considerations suggest that, all else constant, the long-term effect of the pandemic may be an increase in cohort-specific cognitive and chronic conditions due to exposure in utero and during infancy. Because the impacts of Covid-19 are unequally distributed within a population, these delayed effects will reproduce or augment current adult health and mortality inequalities. Individuals with limited resources who are less able to cope under normal conditions are far more likely to contract Covid-19 and less likely to experience a smooth recovery. Since early-infant and childhood health also influences educational attainment and adult labor-market success, the health-related effects of the pandemic can also eventually exacerbate socioeconomic inequality. To this we must add other inequality-enhancing mechanisms triggered by responses to the pandemic, such as those associated with the quality of learning—schooling disparities that result from adoption of online instruction, disruption and discontinuation of school attendance, or family displacement.

The Contribution of Population Research

Population researchers could contribute to tackling these problems in two ways. First, based on an existing rich knowledge base, they could formulate new studies to shed light on long-term consequences, using as a foundation the investigation of problems that have been identified by studies of the 1918 pandemic. Fifty or 100 years from now, population sciences will want answers to questions such as the following. To what extent did children who were in utero or infants during the Covid-19 pandemic experience limitations in physical growth, excess illnesses, metabolic dysregulation, obesity, allergies, cognitive deficiencies? How do these children compare to those who were directly exposed to maternal infection in utero or contracted the virus in infancy and during early childhood? What are the social and economic gradients in these outcomes? Did these children experience different health conditions when they became adolescents and adults? Did they follow different educational and occupational trajectories and have differential labor market success? To what extent did their experience contribute to health and socioeconomic inequalities over their life course that will be manifested 50 or 100 years from now?

There are a number of ways to position population sciences to investigate such questions. A first option is to initiate new mother-child cohort studies that combine data collection on experiences with Covid-19, family exposures, and coping strategies with retrieval of biomarkers at regular intervals of time. Draw a national sample of females who are pregnant during the pandemic, those who give birth and their children aged 0–4. Gather hospital records with information about pre-pregnancy, pregnancy, and delivery; retrieve biomarkers from mothers and children; and establish a protocol to follow them for a period of time until, say, physical growth comes to a halt. This will result in a body of data ranging from conventional demographic and socioeconomic information to markers of physical growth, cognitive scores, school performance, and exposure to risk behaviors (poor diet, lack of exercise, smoking). With suitable identifiers and consent, the data-collection effort will make possible the formulation of additional studies to investigate outcomes at different stages of the life cycle of the same population. Some countries (Spain) are already planning data collection of this sort.

A second possibility is to piggyback on existing studies such as, in the United States, the National Health and Nutrition Examination Survey (NHANES), the Adolescent Health Study (AddHealth), the Fragile Families Study, or even the Early Childhood Longitudinal Study (ECLS) survey series. While not all include mothers and their children as targets, it is possible to either add new subsamples of mother-children pairs or, alternatively, recruit children of current participants. While most of the data needed are retrievable via traditional interviews and biomarker collection, an important enhance-

ment would be to link mother-children pairs to health and hospital records in order to add clinical diagnosis and evidence of treatment. As these studies are likely to remain in place and already include representation of minorities and disadvantaged groups, they could become vehicles for collecting cohort-like information that comes close to, but is less expensive than, new cohort studies built from scratch.

A third possibility consists of selecting small urban and rural areas within larger regions, obtaining access to hospital and health care centers, and identifying and sampling mother-child pairs. This has already been done in some European cities to study child obesity. This sample could then be paired with random samples from the same area and the entire population thus recruited followed for a number of years. If fielded in several areas (provinces, states), these region-based, quasi case-control studies should support inferences about heterogeneity of impacts.

Elder Health, Covid-19, and the Intergenerational Social Contract

Although there are still many unknowns, it is clear that the near- and medium-term health effects of Covid-19 on the elderly will dwarf those experienced in younger populations, for a number of reasons, including high prevalence of preexisting conditions. As a result, the brunt of mortality excess and Covid-19 sequelae will be experienced by the elderly. Two consequences of this pattern are relevant.

Covid-19-related mortality will change the frailty composition of elderly survivors and will induce a short-term improvement of healthy life expectancy. As a result, the average health-care burden on family and kin will contract somewhat, providing temporary respite to younger cohorts and especially women. However, because of lingering aftereffects among elderly Covid-19 survivors, it is quite possible that these short-term impacts will reverse course when these individuals attain older ages. As a result, the brief increase in healthy life expectancy will be followed by a drop and the decrease in expected years in disability will reverse into an increase. The resulting expansion of demand for health care will compound existing pressure on the health-care system. To make matters worse, it will increase the burden of elder care in the younger generations, whose resources will be stretched as a consequence of Covid-19's impact on their own lives.

This situation has implications for the intergenerational social contract. Most societies have in place systems sustaining intergenerational monetary, in-kind, and time transfers that still closely involve family and kin. In some cases, the direction of transfers is from children to elderly parents, while in others it is the reverse. The direction, quantity, and nature of flows depends on traditional norms, social class, aggregate economic conditions, and the

state of the nonfamilial intergenerational transfer system. It is likely that the effects of the pandemic will add stress to these family- and kin-based intergenerational flows for reasons set forth above. As a result, there will be increased pressure to develop or expand existing nonfamily and nonkin-based forms of transfers, essentially public. All this will be at a time when governments will be under post-crisis fiscal pressure, strapped by debt they were obliged to take on to sustain the near-term emergency response.

The Contribution of Population Research

Population science is exceptionally well positioned to meet the research challenge posed by these problems. There are now in place many longitudinal surveys of the elderly: the Health and Retirement Survey (HRS) in the US, the collection of Surveys of Health, Ageing and Retirement in Europe (SHARE) in many European countries, the English Longitudinal Study of Ageing (ELSA) in the UK, and many others. To turn these into tools for collecting information needed to study both the swings of healthy life expectancy and the strained intergenerational social contract is neither difficult nor expensive. In contrast to the case of research on children, the key challenge will be to create a study design guided by the right questions, not the collection of more information. Piggybacking on these surveys is feasible without refreshing samples beyond what these studies already plan to do. It only requires the addition of new questions in modules of intergenerational transfers, self-reported conditions, activities of daily living (ADL) and instrumental activities of daily living (IADL), and intergenerational transfers and assistance.

Two new protocols could be added to those already in existence. First is the collection of health records of survey participants who survived the infection and those who died as a consequence of it. These data will provide rich information related to diagnostic and treatment. Second, in those cases where DNA collection has already been done, an effort should be made to draw new biomarkers using saliva, full or dried blood spot samples. Among other problems, this will support investigations aimed at identifying genomic regions associated with severity of symptoms (e.g, the ACE2 gene).

Young Adults, Covid-19, Closure of Opportunities and the Diffusion of Hopelessness

What about the "sandwich generation"—those who when the pandemic struck were in high school, college, or had recently married and initiated careers, or are forced to drop out of the labor force to care for young children? Due to a number of reasons, adolescents and young adults have so far experienced the bulk of infections. However, the short-term course of the disease appears to be quite mild in this population. It is possible that, even if

reinfection occurs, its effects will not be more serious than those experienced during the first episode.

While these considerations suggest a rather benign outlook, there are two consequences of the pandemic that could leave deep scars in these cohorts. First, there is some empirical evidence that the virus causes organ damage in a subset of otherwise healthy individuals, even among those who experience only mild effects. Symptoms include loss of memory, cognitive impairment, sleep disruption, and a number of physiological anomalies such as respiratory insufficiency, kidney dysfunction, and heart irregularities. Although not much is known about the risk factors associated with these responses or about their duration, there is growing concern that they may compromise the affected individuals' capacity to resume normal activities at work, in school, and in the household. Furthermore, we will not know for some time whether, in addition to these short-term responses, there will be others that will be felt as delayed effects in later adult life.

Second, members of these cohorts are most likely to experience the brunt of all the long-term nonhealth-related impacts of the pandemic. A list of these is long and may include a number of economic outcomes ranging from failure to get a good career start, to unstable incomes due to precarious employment and frequent spells of unemployment, resulting in an inability to save. All this with a powerful gender bias and amplifying existing inequalities between those who will be able to resume their planned economic life course after normality is reestablished and those who will find themselves irretrievably displaced from it.

These economic impacts will have consequences of their own, some of which may be union postponement and disruption, fertility limitation, delayed or foregone home purchase, and lack of resources to defray children's education costs. Some of these are consequential for the young adults' offspring, who will grow up in deprived environments and will see their own future compromised, as well. Finally, in the US, at least, these potential effects may combine to worsen current conditions that produce young adult hopelessness and poor future outlooks all of which result in the promotion of unhealthy behaviors such as smoking, alcohol and drug consumption/addiction, and other self-destructive habits that translate into excess adult mortality.

The Contribution of Population Research

The question that the grandchildren of today's population researchers might want to investigate is not just how the pandemic wreaked havoc on today's cohorts of young adults, but how, through the damage it inflicted on the parental generation, it transmitted damage to the next generation. Many countries have in place studies that could be modified to take on the task of collecting suitable information and investigating these issues. For example, in

the US, there are surveys such as the National Longitudinal Survey of Youth (NLSY), the Survey of Income Program Participation (SIPPS), the Panel Survey of Income Dynamics (PSID), and perhaps even the Current Population Survey (CPS), all data-collection enterprises well equipped for the task. There is probably not even a need to recruit new participants (aside from those already planned). Much as in the case of elderly surveys, it suffices to tinker with the standard questionnaires by adding items or entire modules. Furthermore, in most developed and some developing countries, governments have administrative data on employment, wages, income, education, household composition, and, sometimes, health/mortality. These data can also often be linked to census-type surveys to fill in gaps in the purely administrative data and complement the information retrieved from longitudinal studies.

Summary

Admittedly, the study of the long-term effects of exposure among infants and children is a tall order. We are, however, in possession of knowledge and techniques that did not exist in 1918 and, unlike scientists then, we understand quite well the potential long reach of a shock of the magnitude and duration of Covid-19. The marginal costs of piggybacking on existing studies are in all likelihood an order of magnitude lower than those associated with a new cohort study. At the very least we should pursue one or a series of these and be always guided by what we have learned in the debate about the 1918 pandemic. Irrespective of the type of study we put in place, an overarching issue should be the intergenerational transmission of damage. The assessment of impacts on the elderly is a less taxing enterprise but it too requires a focus on problems that affect both the older generations and, simultaneously, their children and grandchildren. Investigation of these issues will be considerably enhanced by the fact that the instruments of today's population scientists are far superior to those available to researchers who lived through the 1918 flu. We have highly refined machinery to collect, link, organize, and process empirical data. We are in possession of more sophisticated analytical techniques to find patterns in the data and test conjectures. And, not insignificantly, we have vastly superior knowledge of the mechanisms that can produce long-term effects after exogenous shocks of similar scale.

Issues of Demographic Data Collection during Covid-19 and Its Aftermath

Eduardo L.G. Rios-Neto

Before the Covid-19 pandemic, a revolution in demographic data collection in developing countries` national statistical offices (NSOs) was dawning. This revolution includes topics such as data science, big data, administrative data, satellite images, grid statistics, the use of biomarkers in surveys, and computer-assisted interviews, among others. The Covid-19 outbreak accelerated this revolution. Most advances in data collection achieved during the pandemic are likely to prevail in its aftermath. Based on my own experience, I start this brief statement with a review of Covid-19 in the Brazilian household survey (Pnad Contínua) and a new pulse survey (Pnad Covid19), both conducted by IBGE (the Brazilian National Statistical Office). Then, I analyze the implications of postponing the Brazilian 2020 Demographic Census to 2021. Finally, I discuss the consequences of advances in data collection for future data analysis, including for assessing the impact of Covid-19.

The Brazilian Household Surveys (Pnad Contínua and Pnad Covid19)

Pnad Contínua is a rotating panel household survey. Each new household included in the sample is interviewed five times in months t and t+3, before leaving the panel. Results are published by quarters and monthly using moving quarters. The survey is the official source of the unemployment rate, annual per capita household income, and inputs for calculating the monthly inflation rate.

On the upsurge of the pandemic, IBGE adopted social distancing starting March 17, 2020. Pnad Contínua was at risk of discontinuation. IBGE mitigated this risk by moving from a computer-assisted person interview (CAPI) to a computer-assisted telephone interview (CATI) using a mobile computing device (MCD) or personal digital assistant (PDA). The traditional CATI surveys

Eduardo L.G. Rios-Neto, Instituto Brasileiro de Geografia e Estatistica, The National Statistical Office.

https://doi.org/10.31899/pdr1.1009

are not compatible with social distancing because they occur in cramped call centers (LAB-CATI). The natural solution was to place the interviewers working from home (WH) using an MCD or portable smartphone (WH-CATI). I consider this reliance on interviewers' WH-CATI as an innovation in Brazil and other Latin American countries such as Argentina, Chile, and Mexico.

A significant challenge for implementing a CATI survey is how to obtain telephone numbers to reach the sampled households. Less than half of the interviewers collected phone numbers in the first round of surveys. All households in the new strata did not have telephone numbers attached. An alternative to obtaining these numbers was to obtain them directly from telephone companies, but the Brazilian Supreme Court ruled against this option. The solution was to obtain the numbers by matching the survey sample with administrative data using the addresses as a block variable. However, not all telephone numbers worked. Some local IBGE offices tried telegrams or relied on motorcycle couriers to obtain the telephone numbers in person. An essential comparative finding contrasting with classical telephone surveys is that the refusal rate in the WH-CATI survey, conducted by our trained interviewer, was much lower, less than 5 percent, than the average refusal rate of around 40 percent. The sample coverage rate comprised more than 60 percent of the households sampled before social distancing, usually leading to the publication of statistics at national and state levels, within a reasonable confidence interval.

Due to the pandemic, IBGE designed another household survey (Pnad Covid19). The new survey provided information on flu symptoms, hygienic habits, reports of personal Covid-19 tests, seeking health care, type of facility visited, labor market experiences (people in and out of the workforce, employed workforce away from work due to social distancing, employed population working from home, number of people working in informal employment, etc.), and income (earnings, retirement income, unemployment insurance, conditional cash transfer receipts, emergency Covid-19 allowance). The option to implement this new survey was also to generate alternative labor statistics in the case of an eventual discontinuation of the traditional Pnad Contínua.

The Pnad Covid19 is also a WH-CATI. It is a fixed panel comprised of the households sampled in the Pnad Contínua during the first quarter of 2019. The sample corresponds to 92 percent of the 211,000 households, comprised of those with a telephone number in the questionnaire. Not all telephone numbers were valid, so matching with administrative data was also necessary. We divided the sample equally into four weeks, providing independent results. Due to its fixed panel nature, we interview the same households each month. IBGE publishes the results both weekly and monthly. The coverage rate of telephone interviews averaged around 70 percent of the sample. The sampling strategy enables us to correct for possible selectivity caused by tele-

phone interviews by comparing them with personal interviews conducted in the first quarter of 2019. The first month covered by Pnad Covid19 was May 2020. It is scheduled to last until November 2020 due to the panel's attrition. IBGE may conduct the panel survey interviews again in the future. In this case, we could perform an analysis before (2019 sample anchor and baseline), during (first wave of Covid-19 from May to November 2020), and after (date to be defined after waves of Covid-19). This temporal analysis could inform an impact evaluation of the pandemic.

In a nutshell, the Pnad Covid19 provided useful data on self-reported flu symptoms that could be a proxy for Covid-19, emphasizing the loss of smell and taste as an essential trait. It showed that most of those with symptoms seeking medical treatment relied on the Brazilian universal and free- of-charge Public Health System (SUS). The number of persons in the formal labor force declined during the Covid-19 pandemic while a significant proportion of those working moved to do so from home. Finally, the Brazilian Government's emergency Covid-19 allowance raised a substantial proportion of low-income households out of extreme poverty during the pandemic's first six months.

Covid-19 and the Demographic Censuses

Covid-19 hit the planned 2020 round of demographic censuses hard. In those countries where the pandemic census operations were already underway (e.g., Mexico and the United States), it was difficult to stop. But, like many other countries that had not initiated the census before the onset of Covid-19, Brazil faced the postponement of census operations to 2021. In the Brazilian case, coverage difficulties, length of the questionnaire, and budgetary ceiling were already weakening national census operations. However, Covid-19 raised census operation difficulties to another level.

In the 2010 Brazilian Demographic Census, the interview mode was CAPI, with the use of MCDs for the first time. IBGE was planning to maintain the same strategy in 2020. With the outbreak of the pandemic, four factors reinforced IBGE's caution regarding the CAPI mode: uncertainty regarding the duration of the first wave of contagion, the possible upsurge of second or further waves, the lack of vaccines for census collectors, and the likely absence of herd immunity. A risk-averse strategy is to adopt a mixed and concurrent data-collection strategy, CAPI, and CATI. CATI requires telephone numbers, which can be obtained using the match of household lists with administrative data. Alternatively, telephone numbers can be collected at the beginning of the census operation, during the field verification of household listings in the census tracts, with minimum personal interaction protocols. A third data-collection alternative is CAWI (Computer Assisted Web Interviewing).

This self-enumeration strategy enumerates hard-to-reach households such as gated residences and wealthy families. CAWI is also the last resource for unsuccessful CAPI and CATI interview attempts.

As mentioned earlier, IBGE had to deal with complex issues associated with census coverage, even before Covid-19. The uncertain environment due to Covid-19 aggravated these challenges. A risk-averse strategy is the application of technical tools to monitor the census operation. The estimation of population and dwelling density at the grid- or census-tract level is a control strategy to the three phases of a demographic census. It helps to evaluate the quality of the households` listings during the pre-enumeration phase. It also contributes to the daily measurement of coverage in the census tracts during the enumeration phase. Finally, it is an alternative technique to evaluate census coverage and enable imputation during the post-enumeration phase. Another technical tool is the real-time application of demographic indicators such as sex ratio, age reporting, etc., displayed in dashboards so that the operation can correct problems during the census enumeration phase.

It is tempting to include Covid-19 questions in the census, but we have to consider that the census operation is planned well in advance to the enumeration stage. The Brazilian census consists of two questionnaires, a basic (short) questionnaire applied to all households and a long one devoted to a household sample. If a demographic census provides precise population enumeration, broken down by socioeconomic attributes, it will fulfill its primary role. Regarding Covid-19, it is crucial to have denominators (population at risk) to analyze several indicators, especially the attack rate.

Other Data Collection Innovations and Methodologies Contributing to the Analysis of Covid-19

The academic community will consider the Covid-19 pandemic as a marker for several natural experiments with potential to analyze causality. At the micro-level, a longitudinal dataset would be crucial for these studies. Unfortunately, longitudinal surveys are not typical in developing countries. The sampling strategy in the Pnad Covid19 consisted of selecting sampled households previously chosen in the first quarter of 2019 in the Pnad Contínua. It is possible to conduct the "before" (first quarter of 2019) and "during" (from May to November 2020) analysis, using the Pnad Covid19 data. If IBGE recovers the Pnad Covid19 panel in the future, then the "after" component will enable even more robust causal analyses.

The use of biomarkers in surveys is becoming more diffused, although still not prevalent in developing countries. Testing for Covid-19 has become essential for tracking herd immunity and other aspects. This testing information linked to a longitudinal dataset is crucial for causal analysis. The Brazilian

Health Ministry considers the possibility of testing the whole Pnad Covid19 sample, which would enrich this type of research.

IBGE conducted two national health household surveys (Pesquisa Nacional de Saude—PNS) with independent samples in 2013 and 2019. These surveys are comprehensive on lifestyle habits such as smoking, alcohol consumption, physical exercise practices, etc. They also include the prevalence of chronic diseases among household members. Even before the pandemic, IBGE planned to match the individuals in these households with the vital registration of deaths. The datasets linkage will entail a mortality analysis. With the onset of Covid-19, it will be possible to perform a before-and-after study, including the mediating role of lifestyles and comorbidity factors.

If the demographic census measured household deaths due to Covid-19, there would be relevant applications. This census question complements vital statistics in terms of measuring socioeconomic differentials. Another critical factor not available in vital registration is the role of household composition, especially the presence of the elderly and the measurement of household-level transmission, which might translate into more than one death. The role of the high bedroom density of individuals is a micro-level factor in the diffusion of contagion. Deaths in the census also entail analyzing ecological (macro-level) differentials such as a cluster of segregated residential areas comprised of dwellings with low sanitation coverage, residence in slums, the proximity of houses, etc.

In a nutshell, the pandemic forced national statistical offices to innovate to keep producing statistics minimizing time-series break. Some of these innovations proved so useful that they should stay in post-pandemic times without social distancing. Also, statistical offices should strive to produce data that could support the new research agenda derived from Covid-19.

Acknowledgments

I thank Susana Guerra and Cimar Azeredo for fruitful discussions. I also benefited from interactions with the United Nations Population Fund (UNFPA), United Nations Statistical Division (UNSD), Inter-American Development Bank (IDB), and the World Bank (WB). I am solely responsible for the opinions in this statement.

Family Demography in the Post-Covid Era

Clémentine Rossier

In their efforts to curb the Covid-19 pandemic, many of the world's governments restricted the movements and activities of people for several months, severely disrupting their daily practices and often cutting them off from routine opportunities and resources. Many people adjusted to these losses by shifting goals, tapping into alternative resources, and coping as well as they could with the collective wave of panic that swept through the media. The health crisis also pushed a vulnerable fringe further into dispossession and precarity, and the pandemic probably widened psychological and social inequalities already present at the population level.

In fact, Covid-19 acted just like other adverse life events such as illnesses, divorces, losing one's job or partner. Demographers know that depending on their preexisting resource endowments, individuals are not equally equipped to cope with crises, and that adverse events have potentially lasting effects on socioeconomic conditions and well-being. Even nondisruptive life events like union formation entertain strong links with inequalities, as better-endowed individuals find it easier to enter into unions, and are more apt at reaping their long-term benefits.

Demographers have studied life events and their links to different forms of inequalities for many decades. In the field of family and reproduction, they have recently monitored trends in teenage pregnancies, "digital mating," civil partnerships, higher-order unions, divorce among older adults, LGBT pathways to parenthood, twin and triplet births, late motherhood, transition to grandparenthood, and so forth, and have examined their relationship with socioeconomic conditions and the well-being of different family members. In line with the disciplinary canon of demography, they have analyzed the age, period, and cohort effects of these events in great detail.

In the post-Covid-19 era, family demographers will probably continue doing just that: they will look at the relationships between the health crisis and the numerical trends in diverse reproductive events, along with its complex age, period, and cohort impacts. Has the Covid-19 pandemic accelerated

Clémentine Rossier, Institute of Demography and Socioeconomics, University of Geneva.

https://doi.org/10.31899/pdr1.1010

the diffusion of new types of family events, such as meeting a partner online? Has it increased the incidence of divorce? Have these societal disruptions delayed fertility decisions, and will there be a subsequent catch-up process? Has access to family planning or abortion services been affected, leading to a surge in unplanned pregnancies and births? And will the pandemic have scarring effects? That is, will we witness Covid-19 cohorts of confined children with a different outlook on life and new demographic behaviors, or Covid-19 cohorts of young adults lastingly affected by the particular way in which they made their first steps into the world of employment or intimate relationships?

But the Covid-19 crisis will perhaps also help push the interdisciplinary life course approach more firmly to the center of demography, leading to a rethink of the research agenda. A central notion of the life course perspective is that the unfolding of individual lives, punctuated by diverse life events, is strongly shaped by societal contexts and crises (Elder 1998). The main idea of this approach is that society-wide events and conditions have knock-on effects for individuals, affecting the ordering and timing of their life events, and that (sometimes small) changes can have lasting effects in later life because of path-dependency, accumulation processes, and turning points. It also focuses on the large variations—and the strong interconnectedness—between individuals. In other words, the life course perspective provides a blueprint, a systematic framework for studying the effects of major crises on individual and family life events and for understanding how they tie in with the varied dimensions of inequality (Bernardi et al. 2019).

By shifting their gaze toward this interdisciplinary research stream, demographers could integrate more actively some of the latest developments in the sociology and psychology of the life course. Like sociologists, they could pay attention to age effects as a manifestation of socially constructed age norms and institutions, as they do for gender differences (Levy and Bühlmann 2017). They could examine life events as potential watersheds where individuals move into paths of upward or downward social mobility, through gatekeeping and social reproduction processes (Buchmann and Steinhoff 2017). Demographers could simultaneously examine these life trajectories from the perspective of developmental psychology (Baltes et al. 2007) or through the lens of aging processes (Cullati et al. 2018). They could integrate these different disciplinary streams by turning to agency-within-structure meta-theories, where collective expectations and constraints confront individuals' sense of self and aspirations.

While the notion of identity has been a popular junction point for sociologists since Giddens, and while the Theory of Conjectural Action for fertility and family change (Johnson-Hanks et al. 2011) convincingly elaborates upon the interplay between structures and individual-level circumstances, such constructions can still be extended at the inner-individual level. I was especially convinced by the integration of elements of the psychology of

motivation in life course research (Heckhausen and Buchmann 2019). This theoretical approach delves deeper into the (non)integration of social norms and values by individuals in the form of personal goals; it documents the conditions in the immediate environment (autonomy, affiliation, competence) that are needed by individuals to set and pursue goals maximizing their emotional well-being and other outcomes (Deci and Ryan 2008).

By widening the theoretical basis of life course processes from an interdisciplinary perspective, demographers would shift their attention to the resources and obstacles of all kinds that determine how individuals manage (or not) to deal with both society-wide crises like the Covid pandemic, and disruptive family events. In this perspective, family demographers could take a fresh look at family forms (often studied rather descriptively as consequences of family events) by considering them as sets of relational constraints and resources. They could ask how family relations are different in this regard compared to other close relationships, which would extend their reach into the study of extra-household and subjectively defined family forms (Widmer et al. 2013; Seltzer 2019). Different types of exchanges (care, socioeconomic, social influence, symbolic) and practices (sexuality, reproduction, cohabitation, cultural transmission, rites and rituals, and so forth) inherent to family ties across a diverse range of network members could be tracked more systematically. The relational adaptation of individuals and their changing inner circles could also be studied more fully using longitudinal study designs. The extent to which life events in other domains (residential mobility, working career, and so forth) lead to turnover of close and family relations could be examined in more depth. Other possible topics include the role of extended kinship ties and other weak relations in providing reservoirs of close relations, and the impact of spatiality, information, communication, and mobility technology on all of the above. Thanks to this additional knowledge, the role of families as matrices of resources or constraints for coping (or failing to cope) with various crises could be examined more thoroughly.

These advances would help demographers participate more actively in the discussion on indicators of human welfare used as governance tools at both national and international levels (the Sustainable Development Goals, for example). With the move away from income as the sole indicator of success, other markers of quality of life gained ground, including life expectancy and education in the early 1990s (the Human Development Index), followed by other measures of population health, including subjective or emotional well-being as stated in Goal 3 of the SDGs. Indicators of social affiliation (notably measures of potential support and of social participation) now also feature on the latest dashboards, especially in wealthier nations. In the framework of these discussions, family demographers should be in a position to contribute their expertise on the measure of meaningful relationships; shifting their attention to families not only as forms but as sets of resources and constraints should help them do just that.

This issue brings us to another point: sustainable human welfare. While health crises like the Covid-19 pandemic may have temporarily overshadowed concerns about the deterioration of our physical environment by suddenly depriving people of their routine resources, it also prefigures the changes that will probably be needed to bring individual consumption into line with planetary limits. Gaining in-depth knowledge of how individuals function well in constrained environments, including by relying more, or differently, on relational resources, will be a key research area for the next decade. This is probably a factor behind the current interest in subjective (or emotional) well-being in the social sciences in general, and also in family demography. Indeed, rather than aiming at ever longer lives or greater wealth, which all come with major societal and environmental costs, putting "well-being" for all at the core of governance may be the only way to engage the transition toward sustainability (Gough 2017).

In a first book on human need published in 1991 with the philosopher Len Doyal, Ian Gough (Doyal and Gough 1991), a social policy specialist, argued that societies should strive to provide a minimum level of intermediary needs satisfaction to all (civil rights, nutrition, shelter, protection, health care, education, significant others, decent work, and so forth), which in turn will allow them to maximize their current physical and mental health (basic human needs). As opposed to Maslow's crude theory, this frame does not posit a hierarchy of needs (none has to be met first): the distinction introduced simply reflects a specific localization, basic needs satisfaction occurring at the inner individual level and intermediary needs satisfaction through individuals' interactions with their immediate environment.

Moreover, while needs are arguably universal, Doyal and Gough (1991) stress that the ways to satisfy them are eminently context-specific. Gough (2017) links human need satisfaction to sustainability: to him, focusing on minimally satisfying these intermediary needs for all—while a colossal challenge for humanity—will help in implementing the structural changes needed to drastically curb environmentally demanding practices among wealthier countries and social groups while promoting social justice. Here, well-being (basic need satisfaction) acts as a central yardstick, as a high level of well-being can be maintained in the long-term even when limiting nonsustainable consumption; but the needed conditions—collective representations and publicly provided services probably play a key role—remain to be elucidated. Family demographers may have much to say about the role of relational resources and social participation in bringing about change in consumption patterns and in making up for the decline in environmentally costly activities involved in the production of well-being.

References

Baltes, P.B., U. Lindenberger, and U.M. Staudinger. 2007. "Life span theory in developmental psychology," in R.M. Lerner and W. Damon (eds.) *Handbook of Child Psychology: Theoretical Models of Human Development,* pp. 569–664. John Wiley & Sons.

Bernardi, L., J. Huinink, and R.A. Settersten, Jr. 2019. "The life course cube: A tool for studying lives," *Advances in Life Course Research* 41: 100258.

Buchmann, M. and A. Steinhoff. 2017. "Social inequality, life course transitions, and adolescent development," *Journal of Youth and Adolescence* 46(10): 2083–2090.

Cullati, S., M. Kliegel, and E. Widmer. 2018. "Development of reserves over the life course and onset of vulnerability in later life," *Nature Human Behaviour* 2(8): 551–558.

Deci, E.L. and R.M. Ryan. 2008. "Self-determination theory: A macrotheory of human motivation, development, and health," *Canadian Psychology* 49(3): 182.

Doyal, L. and I. Gough. 1991. A Theory of Human Need. Macmillan.

Elder, Jr., G.H. 1998. "The life course as developmental theory," *Child Development* 69(1): 1–12.

Gough, I. 2017. *Heat, Greed and Human Need: Climate Change, Capitalism and Sustainable Wellbeing.* UK, USA: Edward Elgar Publishing Limited.

Heckhausen, J. and M. Buchmann. 2019. "A multi-disciplinary model of life-course canalization and agency," *Advances in Life Course Research* 41: 100246.

Johnson-Hanks, J.A., C.A. Bachrach, S.P. Morgan, and H.P. Kohler. 2011. *Understanding Family Change and Variation: Toward a Theory of Conjunctural Action* (Vol. 5). Springer Science & Business Media.

Levy, R. and F. Bühlmann. 2016. "Towards a socio-structural framework for life course analysis," *Advances in Life Course Research* 30: 30–42.

Seltzer, J.A. 2019. "Family change and changing family demography," *Demography* 56(2): 405–426.

Widmer, E.D., G. Aeby, and M. Sapin. 2013. "Collecting family network data," *International Review of Sociology* 23(1): 27–46.

Covid-19 and the Opportunity for a Demographic Research Reset

ZEBA SATHAR

THE COVID-19 PANDEMIC has unalterably changed the world. We are repeatedly told that things will never return to where they were and we must prepare to embrace the "new normal." For demographers, too, there is a need to remain relevant and responsive to the new realities. Many of us who have worked on analyzing mortality and fertility trends leading to the completion of the demographic transition may need to reexamine these trends in light of emerging new demographic norms and behaviors.

The year 2021 can be seen as an opportunity for demographic research to be bolder and for broadening the canvas of our work. It may be an opportune time to collaborate with other disciplines to tackle social policy, climate change, and political economy discourses where we have remained on the fringes. There is an opportunity for demographers to become more relevant and for the discipline to establish its centrality in the post-Covid world.

Several areas come to mind for the short-, medium-, and long-term demographic research agenda, both during and after the Covid-19 crisis. In the immediate term, during the Covid-19 peak period, demographers must join the study of the impact of the pandemic and be part of the solution, helping to tackle the pandemic, certainly in middle- and lower-income countries. Demographers can contribute to sharpening the policy response by helping to understand the spread and impact of the virus, and devise strategies for its containment. They can complement and strengthen epidemiological efforts by leveraging demographic tools and approaches for data collection and analysis. While epidemiologists provide data on the incidence of Covid cases, deaths, and positivity rates, demographers have expertise on population distributions and densities to estimate the spread and estimate who is most affected, how many are likely to get infected, and the impact in terms of changing death and birth rates.

In particular, it is important to lead on the challenge of how ongoing data collection can be used to build evidence concerning the pandemic. How can we use demographic surveillance better? Where can we be strategic and

Zeba Sathar, Population Council.

https://doi.org/10.31899/pdr1.1011

piggyback additional questions onto ongoing surveys? And how can we create longitudinal panels to study long-term cross-generation effects?

A conventional demographic area where we can make immediate contributions is projections concerning the demographic effects of disruption in health services. In May 2020, when UNICEF projected that 29 million new babies would be born in the next nine months, the majority in South Asia, it was big news! However, it is the responsibility and domain of demographers to point out what is usual and what is unusual in the above example, to contextualize the number projected by UNICEF through comparison with the number that would have been born under normal scenarios. We should be ahead of the curve, predicting a rise in births due to higher conception rates due to lockdown or a rise in unwanted pregnancies due to the disruption in access to contraception services.

Another topic that has received much attention is how closing and disruption of regular outpatient departments and nonemergency services might increase risks of maternal and child deaths in particular. Demographers can certainly contribute to the accuracy of the health and mortality projections being used.

A more challenging and less conventional area of research will be for demographers to get involved in the crucial debates about the effect of lockdown in reducing death rates versus its cost for livelihoods during Covid. One of the major tensions across the world is when and whether to allow the full relaxation of shutdowns as the pandemic goes through its several waves and how this affects economic recovery. Currently, this is almost entirely the domain of economists, but we can certainly challenge some of the theories being promoted.

In political terms, a relaxation of lockdown is presented as a means to permit the working classes and the poor to eke out a living. But this is often being done at the potential cost of thousands of people being exposed to the infection and potentially thousands of preventable deaths. The perspective that shutdowns would have a huge economic cost in low-income countries that might far outweigh health benefits is illustrated in a study by two Yale researchers that caught the attention of those in the highest echelons of political discussions in South Asia. The other point of view, mainly spearheaded by public health and other less powerful groups, focuses on the dangers of lifting lockdowns and putting millions of voiceless, faceless workers outside their homes at high risk of death. Demographers have been largely absent from this discussion but need to contribute in assessing the probabilities and alternative projections of how many, if any, would die from the economic effects of the lockdown, as against those who would die by coming in contact with the Covid-19 infection.

Migration has not attracted as much attention as mortality and fertility. This will need to change as several of the major influences on population

growth and distribution post Covid will be international migration flows. Several future scenarios of movement and displacements of populations have emerged as a result of the Covid pandemic In particular, international migration flows and streams are likely to be altered. Movement across borders will undoubtedly become more restricted. The crash in the travel industry, which epitomized the benefits of globalization and international connectedness, also bodes ill for international movement, including migration.

Demographers need to capture the new realities and gauge their economic-demographic consequences. Migration will affect livelihoods and compositions of populations in the recipient countries, including the United States, Europe, and the Middle East, which have relied on in-migration as an important component of labor supply and source of innovation. And for the sending countries in the low- and middle-income economies, remittances—often the backbone of livelihoods—are likely to take a nosedive. An area even more neglected but of rising importance in contexts like India is internal migration. Once more, millions of internal migrants are likely to be affected as flows stall due to the concentration of the Covid-19 threat in urban centers.

Covid-19 will have other, related long-term effects on people's life trajectories, across the world. Living arrangements along with work are likely to change, with a direct bearing on familial and intergenerational relationships. Marriages and cohabitation may be delayed and ultimately childbearing will be affected by new ground rules about child-rearing and care of the elderly and sick. There is a potential scope for interdisciplinary research to examine these multilevel impacts of Covid-19.

Women's and girl's empowerment and gender relations and family responsibilities and roles, in particular, need to be revisited. Prior research in these important areas must be revived to study how shocks such as Covid-19 are likely to affect the lives and status of women and girls. Can we expect familial and gender relationships to be renegotiated in the long term? Is there a possibility of a recalibration of gender-related values and restrictions that may enable women and girls to gain autonomy and power?

As part of the reset, we demographers will do well to broaden our field to focus on class, regional, and other inequalities, and study social policy responses to rising threats and their implications. Through our strength as data-driven scientists, there is a chance to weigh in on important debates. We ought to join in the movement to improve the societies and world we live in. Post-Covid, there will be an opportunity to evaluate countries on the basis of whether they considered this challenge an opportunity to reassess public health systems, social safety nets, and social justice. The choice is between a society driven by the concentration of power and money for a few, or health and decent life for all, a society where every life counts.

Using this challenge of a reset of societal values as a premise or framework, we could start framing the task of building a more egalitarian society

where there is no tolerance for inequalities. Given that many other scientists in realms such as history, economics, sociology, public health, and political science are also studying this pandemic and its social responses, we should ask: What is demography's comparative advantage and unique position? Demographers can research whether states that provide basic social services fared better in their response to Covid than others that abdicate the basic responsibility for health and education. We could contribute to the research on the impacts on the poorest and other excluded populations and how social safety nets can best be structured to ensure that these groups are able to sustain shocks such as Covid-19, now and in the future.

Demographers, working with other disciplines but retaining their niche with numbers and analytical tools like projections, can ensure that we are not just left with the hortatory language of the Sustainable Development Goals (SDGs). In practical terms, demographers are best equipped to give tangible shape to many of the interrelated SDGs. Environment and climate change are an important part of the SDGs and an emerging area is the intersection of climate change and vulnerability of the populations most exposed. Climate change research has been quite limited in incorporating the actual numbers and characteristics of those who are most vulnerable and whose lives and livelihoods will need adaptation, and are most likely to be directly affected. These are some of the interlinkages on which the new generation of demographers must lead.

Lastly, the reset for demographers beyond Covid-19 extends to questions about our normative assumptions about what the end of history (progress) in demographic transition looks like for fertility, mortality, and migration. Demographic transition theory is based on a progression of societies from high to low fertility and mortality. But what if these were not the natural end of demographic history? Can Covid-19 force us to rethink demographic theories? Could demographic transitions include waves of reverse migration, upturns in mortality, and increases in fertility in the face of Covid-like pandemics and diseases? The expectation of the new normal for demographers should entail both internal reflection and outward transformation of the field.

Demography Beyond the Foot

Jenny Trinitapoli

When John Graunt wrote about the plague in 1687, he understood that mortality statistics have an importance beyond the task of counting. He noted that "…most of them who constantly took in the weekly Bills of Mortality made little other use of them than to look at the foot how the burials increased or decreased [emphasis added]." It is a stark visual, the foot. I thought about that visual in a new way in February 2020, while teaching Graunt to 18 undergraduates, crowded around a table designed for 15. Although I had read Graunt's Observations multiple times before, that "foot" struck a different chord this time. In the context of a mysterious disease circulating and the ominous knowledge that any airborne virus could not be contained to a particular geography, that foot conjured corpse rather than metaphor.

In the months since, I have thought frequently about John Graunt toiling away by candlelight to convert 50+ years of weekly tabulations of baptisms and burials into something orderly that could reveal statistical regularities of mortality. Reflecting on what kind of work demographers need to be doing now, and in the decades ahead, I see two giant boulders our field needs to collectively move, and they are not so different from those Graunt started to roll. The first is technical, about the present, and focused on measurement: it is a hymn of praise to the good estimate and a valorization of the indispensable work of counting well. The second is more intellectual; it concerns the future, specifically what will need to be researched in the next 5 to 50 years.

Let us consider first the urgent task: counting to create a clear account of the present. Now, some 350 years after Graunt, our vital registration systems remain patchwork, incomplete, and flawed; our cause-of-death declarations are politicized and imprecise; and these Covid-19 test-positivity rates are guesswork, at best. Nonetheless, we are awash in data, with dozens of Covid-19 dashboards and apps to choose from. Some are calling Covid-19 our first "data-driven pandemic."

A population perspective is crucial for enumerating our current crisis and ensuring the quality of our estimates. Demographers need to keep beating the same drum we always beat: principles of representative sampling, careful

Jenny Trinitapoli, Department of Sociology, University of Chicago.

https://doi.org/10.31899/pdr1.1012

definition of the population at-risk, and correspondence between numerator and denominator. Test-positivity rates are a terrible foundation for any kind of inference. Sentinel surveillance programs have not and will not generate reliable estimates of prevalence or incidence. We learned from the AIDS crisis that HIV prevalence could not be proxied by clinical case studies or data from antenatal checkups; we relied on those estimates for too long, and when the global community finally transitioned to a population-based perspective, we discovered that seroprevalence was far lower than previously estimated. The mortality burden we had understood as a reflection of 30 percent prevalence was actually the consequence of a force much smaller in quantity but more potent in fatality.

A year into the Covid-19 crisis, we have a better handle on case-fatality ratios and death rates than we did for HIV after 20 years. We have rapid tests and sophisticated models but still too few population-based studies. Political leaders across the globe are making major policy decisions without the benefit of basic parameters like age-specific prevalence or a clear and consistent community-level incidence rate. Whether to attribute this failure to a lack of resources, a difference in perspective between demographic principles and the habits of clinical research, or a lack of leadership from demographers remains unclear. I venture that Graunt would be amused by our elaborate tools for displaying data and appalled to see us relying on data plagued by many of the same, irresolvable, interpretive issues that he confronted. The trustworthy denominator is a thing worth fighting for; demographers would do well to get behind the clear and simple message that we cannot safely navigate this pandemic—or future ones—without population-based estimates generated from representative samples.

In the short-run, I expect that the widely circulating facts about Covid-19 will continue to focus on quantities: in particular, the daily case count, the test-positivity rate, hospitalizations, and the daily and cumulative mortality burden. A key lesson from the first 12 months of Covid-19 is that the work of generating sound estimates should not be dismissed as mere counting. If anything, this abundance of new data sources reinforces old lessons from earlier plagues: that vital statistics are difficult to keep, especially so in an emergency.

Our Covid dashboards operate on a second level, unrelated to quantities; they fuel what I call population chatter. Graunt wrote that the Bills of Mortality were, for most, merely "a text to talk upon." And talk, we do. At dinner tables and among WhatsApp groups across the globe, the daily and weekly Covid numbers provide fodder for everyday conversation, and the numbers never speak for themselves. Through population chatter—ongoing conversations with socially salient others about demographic phenomena (including but not limited to mortality rates)—individuals and families weigh evidence, narrate the trade-offs between acceptable versus unacceptable risks, make

personal decisions about how to protect their families and communities, and process unthinkable losses.

Demographers must counter the characterization of Covid-19 as "different" in some fundamental way because of the vast amount of data at our fingertips. People living through this moment do not experience the world by weekly rates; they perceive mortality risk through the experiences of their own social network. When ordinary people engage in population chatter, they are arguing about causation, assigning blame, distinguishing good deaths from bad deaths, and assessing the overall risk environment. Through our narration of the deaths we observe and the illness that preceded them, our conversations about Covid are moralized and politicized, as was the case with AIDS, with the 1918 influenza, with the cholera outbreaks of the nineteenth century, and by Graunt, who asked whether new reigns of kings brought with them new plagues. We are, just as they were, living through a season of confusion that will be resolved, not by facts alone, but by facts organized through the cognitive and moral frames we build to make sense of it all.

The other challenge before us concerns what to research next. Taking a page from the best examples of historical demography and demographic history, it is safe to say that the imprint of a major disease event will be manifest not only in those who die from the novel coronavirus but in the lives of those who survive, in the institutions that crumble and those that persist, and in the cultural practices and social norms that endure and adapt. In other words, it may not be the increase in mortality—the Malthusian oscillation of 2020/21—that commands our attention in the long run. As with other major historical epidemics, we will need to analyze Covid-19 as a test of our social and political structures.

Demographers need to contribute, of course, to a first wave of research (and this is already under way) that specifies the immediate effects of Covid-19 on mortality, morbidity, and bereavement with an emphasis on inequality. Getting this right is hugely important; it will be controversial and politically consequential. This is the corpse-part of mortality research—the foot as foot. Count, classify, compare, repeat ad infinitum. To the extent that our research can both expose and address the fault lines of inequality that structure contemporary populations, this work may be more moral reckoning than estimation problem.

A second wave of demographic research will look beyond mortality and address the immediate consequences of Covid-19 for family life at both the micro- and macro-levels. Graunt pondered the difference between burials and christenings; we will inquire about nuptiality and divorce rates, age-specific fertility rates, and family structure. To elaborate just one example, the consequences for fertility will be manifest in volitional and biological pathways. Among women aged 25–45 across Covid-affected contexts, I expect to see immediate changes through fertility reductions and delays. We will not

be surprised to observe lengthening birth intervals among parents of small children who lack reliable childcare during Covid times—a household-level response. Some reductions will be volitional, due to economic precarity or a lack of extended-family support, while others will be biological as a result of postponement: when women nearing the end of their reproductive lives delay, they may end up having "chosen" to reduce. Because demographers are concerned with the way the whole of a population looks, we may see a renewed attentiveness to age-structure and the multigenerational impact of Covid disruptions in a life-course framework, the consequences of which will play out over decades, not years.

Perhaps the most important suggestion for thinking beyond the foot is present in Graunt's seldom-mentioned subtitle to The Observations: "With reference to the Government, Religion, Growth, Ayre, Diseases, and the several Changes of Said City." Thinking beyond the foot requires us to link our knowledge of mortality and morbidity burdens, in particular, to some questions of ultimate concern. The consequences of Covid-19 as a disease event will bring changes to our religious rituals, burial rites, our routines of food preparation, and ethics of obligation to kin, to neighbors coping with long-term morbidities, and to the earth. Here, we must venture outside of conventional demographic territory to start and sustain conversations with adjacent disciplines and subfields; such exchange may bring new opportunities to export and enrich demographic knowledge and approaches.

Take religious rituals and doctrines: Christians across the globe cannot safely gather in their parishes to sing beloved hymns and drink from a shared cup right now. Virtual Islamic platforms are sustaining daily and weekly prayers while observing social-distancing recommendations. New funeral rites, religious and secular, including the drive-through-wake and Zoom shiva are emerging before our eyes. Young people are improvising expressions of collective grief that combine a new understanding of universal precautions with the nonnegotiable elements of their parents' rituals. All of this can be productively analyzed within a framework of demographic change, and a keen ear to population chatter may help us solve some puzzles about which things change and which stay the same in the wake of this pandemic.

While religious practices are often thought of as settled or fixed, previous research from a population perspective shows that religious teachings and practices are dynamic and responsive to demographic realities. Specific rituals may change quickly, but the consensus positions to justify them unfold over longer periods of time; these tend to be organized around an ethos (e.g., healthfulness and stability to promote social reproduction in families and communities) rather than articulated as a set of practical concerns. We are hearing critiques of the built environment and calls to reform our parks, roads, public restrooms, apartment buildings, hospitals, and schools in the interest of hygiene and health, religious and secular. These critiques echo

choruses of social-gospel-style reform from the Progressive Era. For social gospelers, managing plague required scientific knowledge, the reparation of broken social relationships, and the creation of new safety-nets and structures of care. A scientifically informed project of social redemption to address the casualties of Covid is imminent, and while it may not be explicitly religious or unified, its underpinnings will be moral, particular, and contested.

I'll make these points again in February 2021, when I teach Graunt to 19-year-olds—this time masked and distanced in an awkwardly oversized classroom. Good estimates are worth toiling over, and the residue of Covid-19 will not be confined to the demographic sphere. The ordinary work of enumeration, classification, and comparison is, in some fundamental way, a moral project, and the religious and political transformations that seem, to many, like acts of divine revelation may have a more prosaic explanation: demographic change. What a profound paradox we find in that foot.

Implications of the Covid-19 Pandemic for Economic and Demographic Research

Frank-Borge Wietzke

As we are entering the second or even third wave of Covid-19 infections, much research is still needed to assess the true global health impacts and death toll of the pandemic. This applies in particular to low- and middle-income countries, where testing and diagnostic capacities are still often rudimentary. What we can say with certainty is that the economic consequences of Covid-19 are dramatic. This note therefore concentrates on the socioeconomic dimensions of the pandemic, and specifically their possible interactions with demographic behaviors. I focus on developing regions, where populations are often most heavily affected.

Covid-19: A Magnifier of Preexisting Weaknesses and Vulnerabilities

Across the global South, preventive and containment measures have disrupted labor and product markets and imposed high economic costs on the local population. This was accompanied by rapidly contracting fiscal space, as governments scrambled to mobilize scarce resources for (often piecemeal) emergency interventions. The magnitude and consequences of these developments cannot be understated. At the global level, the Covid-19 pandemic has reversed previous trends toward diminishing between-country inequalities, as capacities for effective monetary and fiscal responses diverge sharply between the developed and developing world. Within developing countries (as well as developed ones), the pandemic has accelerated widening income gaps and social disparities among the population.[1]

Covid hit low- and middle-income nations at a time when—despite often rapid growth and poverty reduction over the past decades—the situation for vast parts of the population was still precarious. Global poverty at the "extreme" purchasing power-adjusted $1.90 poverty line stood at an estimated 9.2 percent before the pandemic. However, this disguised important variation between countries and regions. In less-developed continents like sub-Saharan Africa, national extreme poverty head counts averaged 40 percent and absolute numbers

Frank-Borge Wietzke, Institut Barcelona d'Estudis Internacionals and European University Institute.

https://doi.org/10.31899/pdr1.1013

of extreme poor were either stagnant or declining only slowly, once changes in underlying population sizes were taken into account (World Bank 2020).[2] In addition, tens of millions of those who had escaped poverty were still in economically insecure circumstances. Even small idiosyncratic shocks, such as a short-term loss in income or a health emergency, could push these households back into extreme poverty (López-Calva and Ortiz-Juarez 2014).

These shocks have, of course, been magnified and generalized by the pandemic. In many developing countries, lockdown measures and economic contraction have deprived especially those in informal or precarious forms of employment of their main sources of income. By some estimates, these effects could raise the global poverty head count at the $1.90 poverty line by up to 6 percentage points (Sumner, Hoy, and Ortiz-Juarez 2020). This situation was only partially mitigated by government interventions. Although many countries put in place social assistance programs, these were often short-term and accompanied by reduced access to basic services, as lockdowns limited users' ability to reach facilities. Large-scale debt relief or rapid increases in development assistance withstanding, we should expect government responses to contract further, as public budgets in many emerging economies remain under severe stress.[3]

Consequences for Demographic Research

What are the implications for demographic research? We know from previous studies that, individually, households' coping strategies can affect various parameters that matter to demographic outcomes and reproductive behavior, such as reductions in spending on health care, contraceptives, or girls' education (Skoufias 2003). These economic adjustments are magnified by the social costs and gendered impacts of the pandemic itself. During the Covid-19 crisis—as in previous years—women bear most of the responsibility for childcare, elder care, and housework, while simultaneously providing the bulk of the workforce in the local public health response (Cousins 2020; Hall et al. 2020).

Simultaneously, lockdown measures and increased financial pressures on governments and charities have disrupted access to women's sexual and reproductive health and prenatal and postnatal care. Experiences with past humanitarian crises have shown that such sudden disruptions to health supply can result in growing rates of unintended pregnancies, increased child and infant mortality, as well as a broad range of other reproductive and mental health problems (McGinn 2000).

These widespread shocks may undo decades of progress in advancing gender equality, reproductive health, or even the structural shift toward lower fertility in many developing countries. Learning about the extent of these problems, as well as the appropriate policy responses, will require more integrated research at the interface of economics and social demography. I focus here on three interlinked questions.

First, as long as evidence about the on-the-ground health and economic impacts of the crisis remains patchy in many countries, more systematic analysis will be needed to determine which populations and subgroups were most

affected. These assessments should be based on more robust and representative data sources than were so far (typically) available during the pandemic, and pay particular attention to interactions between household coping responses and impacts on gender, health, and demographic outcomes, as described above.

Second, and adopting a longer-term view, more research is needed to study effects of deteriorating gender and socioeconomic indicators on household- and group-specific fertility outcomes. The purpose of this analysis would be to identify possible divergence in reproductive behaviors that could point to delayed or even reversed fertility transitions for countries or parts of the population. Useful templates would be provided by previous disaggregated research that tried to identify population- or subgroup-specific drivers of lower-than-average fertility reductions in developing regions like sub-Saharan Africa or Latin America (Bongaarts and Casterline 2013; Bongaarts 2017; Rios-Neto, Miranda-Ribeiro, and Miranda-Ribeiro 2018; Wietzke 2020).

Finally, the particular nature of the crisis should be recognized as an opportunity to question some of the more established indicators and subgroup classifications that are often used to proxy for socioeconomic contexts in the analysis of local demographic behaviors. For example, while the validity of binary urban-rural classifiers was already put in question by the rapid growth of intermediary peri-urban areas in many developing regions (Mbiba and Huchzermeyer 2002; Karg et al. 2019), the use of rural identifiers as a stand-in for generalized socioeconomic disadvantage has come under further scrutiny, as impacts of the crisis are often concentrated among urban populations (World Bank 2020). Future changes in lifestyles and production patterns while countries move through the crisis and into recovery may require further reconsideration of these categories.

Where will the data for these analyses come from? In the medium- to long-term, the bulk of systematic and representative studies of Covid-19 impacts will be provided by the usual sources, such as government statistics, population censuses, or nationally representative household surveys. However, these typically arrive with long time lags and at infrequent intervals and may be further delayed by local responses to the pandemic. It is thus unlikely that they will allow particularly up-to-date or fine-grained over-time analysis of Covid-19 impacts in the near future.

In these contexts, it may be necessary to also think about possible alternative data sources. For instance, in the field of economic poverty and vulnerability analysis, researchers often rely on high-frequency telephone surveys to track the effects of Covid-19 and previous economic crises. These often include rudimentary modules on health and demographic behaviors (or could be enriched by such modules), that would permit more up-to-date analysis of the crisis impacts in areas of interest to demographers.[4]

Regardless of the actual tools used, new pragmatic and often-interdisciplinary approaches will be needed to better understand the evolution of socioeconomic inequalities and demographic responses, as societies move through, and hopefully eventually emerge from, the pandemic.

Acknowledgments

Research supporting this essay was funded by the Spanish Ministry of Economy, Industry, and Competitiveness (MINECO) through its Academic Excellence and Societal Challenges initiative (Grant Number CSO2017-87350-P).

Notes

1 https://www.wider.unu.edu/publication/five-ways-coronavirus-deepening-global-inequality. Last accessed August 11, 2020.

2 Estimates are for 2017 and adjusted for local purchasing power differences.

3 https://www.imf.org/en/Publications/GFSR/Issues/2020/10/13/global-financial-stability-report-october-2020. Last accessed August 11, 2020.

4 See, for example, https://www.worldbank.org/en/topic/poverty/brief/high-frequency-monitoring-surveys. Last accessed August 11, 2020. Dabalen et al. 2016.

References

Bongaarts, John. 2017. "Africa's unique fertility transition," *Population and Development Review* 43(S1): 39–58.

Bongaarts, John and John Casterline. 2013. "Fertility transition: Is sub-Saharan Africa different?" *Population and Development Review* 38(Suppl. 1): 153–168.

Cousins, Sophie. 2020. "COVID-19 has 'devastating' effect on women and girls," *The Lancet* 396(10247): 301–302.

Dabalen, Andrew, Alvin Etang, Johannes Hoogeveen, Elvis Mushi, Youdi Schipper, and Johannes von Engelhardt. 2016. *Mobile Phone Panel Surveys in Developing Countries: A Practical Guide for Microdata Collection.* Washington, DC: World Bank.

Hall, Kelli Stidham et al. 2020. "Centring sexual and reproductive health and justice in the global COVID-19 response," *The Lancet* 395(10231): 1175–1177.

Karg, Hanna et al. 2019. "Classifying and mapping periurban areas of rapidly growing medium-sized sub-Saharan African cities: A multi-method approach applied to Tamale, Ghana," *Land* 8(3): 40.

López-Calva, Luis F. and Eduardo Ortiz-Juarez. 2014. "A vulnerability approach to the definition of the middle class," *Journal of Economic Inequality* 12: 23–47.

Mbiba, Beacon and Marie Huchzermeyer. 2002. "Contentious development: Peri-urban studies in sub-Saharan Africa," *Progress in Development Studies* 2(2): 113–131.

McGinn, Therese. 2000. "Reproductive health of war-affected populations: What do we know?" *International Family Planning Perspectives* 26(4): 174–180.

Rios-Neto, Eduardo L.G., Adriana Miranda-Ribeiro, and Paula Miranda-Ribeiro. 2018. "Fertility differentials by education in Brazil: From the conclusion of fertility to the onset of postponement transition," *Population and Development Review* 44(3): 489–517.

Skoufias, Emmanuel. 2003. "Economic crises and natural disasters: Coping strategies and policy implications," *World Development* 31(7): 1087–1102.

Sumner, Andy, Chris Hoy, and Eduardo Ortiz-Juarez. 2020.. "Estimates of the impact of COVID-19 on global poverty." Working paper. United Nations University World Institute for Development Economics Research, Helsinki.

Wietzke, Frank-Borge. 2020. "Poverty, inequality, and fertility: The contribution of demographic change to global poverty reduction," *Population and Development Review* 46(1): 65–99.

World Bank. 2020. *Poverty and Shared Prosperity 2020: Reversals of Fortune.* Washington DC: World Bank.

Covid-19: A Tsunami That Amplifies Existing Trends in Demographic Research

Emilio Zagheni

While different waves of Covid-19 have reached different shores at different times, and the intensity of the consequences have been felt unequally, everyone has been affected in some ways. The pandemic has been a major public health crisis, but the long-lasting effects of this disruptive force will also touch upon many more aspects of our lives and reshape priorities for research. During crises, some commonly held beliefs are questioned and scrutinized. While core principles weather the storm, opportunities to build new and better infrastructure and practices emerge.

In this note, I argue that the pandemic will also be remembered as a watershed moment for demographic research, and the point of rapid acceleration of already existing trends in population studies. These include: rethinking the temporal and spatial scale at which population processes operate; combining heterogeneous data sources, including privately owned ones, with solid statistical methods and research design; and assessing the growing importance of digital connections for social and generational relationships and as determinants of health and inequalities. More broadly, the pandemic has highlighted strengths, as well as revealed inadequacies, in our theoretical understanding of demographic processes, and represents a unique opportunity for theoretical advances in the discipline.

At the foundation of modern demographic research lies the belief that population processes unfold slowly and in fairly predictable ways. Regularities in demographic rates by age, sex, and over time are what makes medium-range forecasts possible (Lee and Carter 1992; Schmertmann et al. 2014). The relative smoothness of demographic rates also informs the type of collection, processing, and distribution of data that happens at national statistical offices and international organizations. Most population statistics are produced at the country level, for one- or five-year periods, and are often published with substantial delays. The pandemic has forced us to rethink the temporal and spatial scales at which demography operates. As weekly excess deaths have

Emilio Zagheni, Max Planck Institute for Demographic Research.

DOI: 10.31899/pdr1.1014

become one of the key metrics of impact of the pandemic across countries (National Academies of Sciences, Engineering, and Medicine 2020), statistical offices quickly adjusted to address new needs. Overnight, demography went from "slow" to "fast" mode as more and more statistical offices reported time series of weekly deaths, in some cases disaggregated by age and sex, or at the subnational level. This rapid response will have long-lasting consequences on how demographers think about the time scale of population processes, and the type of data they produce and use.

Data with high temporal and spatial resolution have always been of interest to demographers. For example, highly granular data are important for assessing seasonality in demographic events (Dorélien 2016), the impact of natural disasters on mortality (Zagheni et al. 2015), the potential role of climate change on migration (Hauer 2017), or the consequences of conflict for fertility (Fargues 2000). Today, we have reached a level of interest in high-resolution data that we have never seen before. The scale of interest and relevance has moved from local settings to a global context. I believe that we are at a tipping point: as more and more institutions have invested resources in producing and releasing weekly mortality reports, and as network effects put pressure on institutions that have not been ready to adapt yet, we will see more and more timely dissemination of death records. This direction will also set a path beyond mortality statistics, and for countries that still have to develop capacity to meet current and future needs. This is not only momentum: it is a corollary of the fact that demographic measures, including mortality, fertility, and migration rates, have been recognized as important indicators of the state of our societies. For example, data compiled by the United Nations Population Division underpin about a third of the indicators used for monitoring the sustainable development goals globally.[1] The growing importance of demographic data that are timely, highly granular, and open will serve as a rising tide for the whole discipline of demography. As more granular data will become available, more opportunities will emerge for solid causal analyses that will invigorate the field and strengthen demographic theory.

Established demographic data sources, like censuses, registers, and probabilistic surveys, are the polar star for population scientists and anchor demographers' orientation. However, in a growing number of cases, these sources are not enough to address today's challenges. The pandemic highlighted the increasing importance of data innovation, privately held infrastructure, and passively collected data. Web giants like Google, Facebook, and Apple have produced and maintained detailed aggregate-level geographic mobility reports, which are useful to assess, among others, the effect of nonpharmaceutical interventions on the spread of the pandemic (Ruktanonchai et al. 2020) and on mortality (Basellini et al. 2020). Online measurement companies for marketers, like Cuebiq, have made anonymous location data collected via apps available to researchers, as part of their "Data for Good" program.

Some of these data have been used to calibrate epidemiological models (Pepe et al. 2020). Facebook ran a large-scale survey of its users to study Covid-19 symptoms, while demographers have used Facebook's advertisement platform to recruit survey participants (Perrotta et al. 2020). This explosion in data availability, as well as in the use of new types of tools and infrastructure for data collection, have highlighted challenges and opportunities ahead. On the one hand, in a crisis context, private companies showed increased willingness to share data responsibly and, to some extent, to shed light on the trove of information that is available to them. That said, these data cannot be taken at face value because of a number of inherent biases. However, when appropriately combined with representative sources and credible statistical methods, they become an invaluable asset for demographic research. For example, according to the World Health Organization, globally two-thirds of deaths are not registered with local authorities.[2] While, in the long-term, comprehensive registration systems would be the preferable solution, in the short- and medium terms, new forms of data collection and indirect methods that leverage the infrastructure of the digital age are key. Emerging network-based approaches for the estimation of demographic quantities (Feehan and Cobb 2019) are likely to receive more attention and I expect that the pandemic will further spur a new wave of innovative approaches to produce the best possible estimates in traditionally data-poor contexts.

Digital trace data are not the result of the pandemic, but Covid-19 has likely changed the perception that companies, scholars, and professional organizations have of these data, thus opening new opportunities for progress. Some of the mixing between industry and academia, along with a realignment of incentives, is likely to have planted the seeds for new forms of joint ventures. If appropriate measures are developed to guarantee privacy, data-protection, and ethical frameworks for the use of digital traces, the pandemic may mark a milestone for the rapid acceleration of partnerships between scientists and holders of private data and infrastructure.

The rapid increase in data availability, often referred to as the "data revolution," is only the aftershock of deeper tectonic shifts in the way we live and interact with others in the digital age. As of 2019, 81 percent of the adult population in the United States owned a smartphone, up from 35 percent in 2011.[3] Worldwide, more than 4 billion people are estimated to use the Internet, up from less than 2 billion people a decade ago.[4] The pandemic has forced more people to engage more deeply with the digital world, with long-term consequences. During lockdowns, communications with colleagues, friends, and members of the extended family took a digital form, for those who had the skills and resources to access digital technologies. As we tried to make sense of the world outside our homes, we turned to Google, Bing, Baidu, or alternative search engines. Daily activities like shopping for groceries moved online for many people. And so did many other aspects of our lives like at-

tending lectures in school or college, consulting a physician, holding family events, dating, working, filing for unemployment, interviewing for a job, and virtually everything that could be moved online.

As social relationships were forced to become digital, we developed a new perception of the online world and its communities. The distinction between online and offline has become more blurred. This has important consequences for our societies and, as a result, for the research landscape in the social sciences. For instance, in public health there have been increased calls for fully considering broadband Internet access as a social determinant of health (Benda et al. 2020). This is consistent with an emerging line of research that aims at assessing the role of changes in information and communication technologies on development (Rotondi et al. 2020), demographic indicators (Billari et al. 2019), health and well-being (Lohmann and Zagheni 2020), and intergenerational relationships (Gil-Clavel and Zagheni 2019; Arpino et al. 2020). Demographers are uniquely positioned to quantify the demographic differential impact of access and use of digital technologies.

The pandemic is likely accelerating underlying trends in demographic research. While this indicates a bright future for population studies, Covid-19 is also shaking some of the pillars on which the discipline rests and exposing some inadequacies of current paradigms. One of the strengths of demography is that it relies on unambiguous definitions of the underlying events of interest. Births and deaths are clearly identified occurrences. However, most demographic measures, like rates, rely also on denominators that include population counts or related quantities, like person-years of exposure. These denominators are typically derived from concepts like the usual place of residence, and should account for migration and relocations. While migration is already particularly difficult to quantify, the pandemic has further challenged our ability to measure usual place of residence, as an increasing number of people have started to work remotely and often relocated temporarily to areas farther away from the usual workplace, sometimes across political borders. Measurement issues related to migration (Deville et al. 2014; Fiorio et al. 2017) will likely become more central for demography as they are crucial not only to understand migration trends, but also to produce accurate estimates of fertility and mortality rates, as well as health indicators, at various levels of spatial and temporal granularity.

A perhaps underappreciated strength of demography is that the toolbox of formal demographers is key to model and quantify a wide range of population issues, from the spread of the virus to the extent of excess deaths, and likely scenarios for the future. As a matter of fact, one of the most elegant theories of formal demography, the stable population theory, is closely linked to compartmental models used in epidemiology, and shares key concepts, like the intrinsic population growth rate, which is closely related to the R0, the

basic reproduction ratio used in models for the spread of infections. While the pandemic reminded the world of the importance of formal demography, it also showed how much uncertainty there is about the long-term consequences of this shock on key components of demographic change, like fertility (Aassve et al. 2020) and migration (Guadagno 2020, O'Brien and Eger 2020). Existing theories provide insights and perspectives, but they remain largely fragmented and may lead to quite different conclusions. Major theories in demography, like the demographic transition theory, describe moves from disorder to stability (Livi-Bacci 2017). However, in contemporary societies we often encounter moves from order to disruptions, related to recessions, conflicts, famines, natural disasters, technological transformations, pandemics, and more.

While each shock is unique in some ways, compiling and analyzing disruptions and their impact on populations could hold the key to reconciling existing theories and formulating a synthesis of our understanding of the relationships between discontinuities and demography. One of the long-lasting consequences of the pandemic might be an increased awareness that, also in the context of demographic theory, we need the whole to become greater than the sum of its parts.

Notes

1 https://www.un.org/development/desa/pd/themes/sustainable-development.

2 https://www.who.int/news-room/fact-sheets/detail/civil-registration-why-counting-births-and-deaths-is-important.

3 https://www.pewresearch.org/internet/fact-sheet/mobile/.

4 https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx.

References

Aassve, A., N. Cavalli, L. Mencarini, S. Plach, and M.L. Bacci. 2020. "The COVID-19 pandemic and human fertility," *Science* 369(6502): 370–371.

Arpino, B., M. Pasqualini, V. Bordone, and A. Solé-Auró. 2020. "Older people's non-physical contacts and depression during the COVID-19 lockdown," *The Gerontologist.*

Basellini, U., D. Alburez-Gutierrez, E. Del Fava, D. Perrotta, M. Bonetti, C.G. Camarda, and E. Zagheni. 2020. "Linking excess mortality to Google mobility data during the COVID-19 pandemic in England and Wales," *SocArxiv*.

Benda, N.C., T.C. Veinot, C.J. Sieck, and J.S. Ancker. 2020. "Broadband Internet access is a social determinant of health!" *American Journal of Public Health.*

Billari, F.C., O. Giuntella, and L. Stella. 2019. "Does broadband Internet affect fertility? *Population Studies* 73(3): 297–316.

Deville, P., C. Linard, S. Martin, M. Gilbert, F.R. Stevens, A.E. Gaughan, V.D. Blondel, and A.J. Tatem. 2014. "Dynamic population mapping using mobile phone data," *Proceedings of the National Academy of Sciences* 111(45): 15888–15893.

Dorélien, A.M. 2016. "Birth seasonality in sub-Saharan Africa," *Demographic Research* 34: 761–796.

Fargues, P. 2000. "Protracted national conflict and fertility change: Palestinians and Israelis in the twentieth century," *Population and Development Review* 26(3): 441–482.

Feehan, D.M. and C. Cobb. 2019. "Using an online sample to estimate the size of an offline population," *Demography* 56(6): 2377–2392.

Fiorio, L., G. Abel, J. Cai, E. Zagheni, I. Weber, and G. Vinué. 2017. "Using Twitter data to estimate the relationship between short-term mobility and long-term migration," in *Proceedings of the 2017 ACM on Web Science Conference* (pp. 103–110).

Gil-Clavel, S. and E. Zagheni. 2019. "Demographic differentials in Facebook usage around the world. in *Proceedings of the International AAAI Conference on Web and Social Media* (Vol. 13, pp. 647–650).

Guadagno, L. 2020. "Migrants and the COVID-19 pandemic: An initial analysis," International Organization for Migration, Migration Research Series (60).

O'Brien, M.L. and M.A. Eger. 2020. "Suppression, spikes and stigma: How COVID-19 will shape international migration and hostilities toward it," International Migration Review.

Hauer, M.E. 2017. "Migration induced by sea-level rise could reshape the US population landscape," *Nature Climate Change* 7(5): 321–325.

Lee, R.D. and L.R. Carter. 1992. "Modeling and forecasting US mortality," *Journal of the American Statistical Association* 87(419): 659–671.

Livi-Bacci, M. 2017. "A Concise History of World Population." John Wiley & Sons.

Lohmann, S. and E. Zagheni. 2020. "Multi-platform social media use: Little evidence of impacts on adult well-being," Max Planck Institute for Demographic Research. Working paper.

National Academies of Sciences, Engineering, and Medicine. 2020. "Evaluating data types: A guide for decision makers using data to understand the extent and spread of COVID-19." Washington, DC: The National Academies Press.

Pepe, E., P. Bajardi, L. Gauvin, F. Privitera, B. Lake, C. Cattuto, and M. Tizzoni. 2020. "COVID-19 outbreak response, a dataset to assess mobility changes in Italy following national lockdown," *Scientific Data* 7(1): 1–7.

Perrotta, D., A. Grow, F. Rampazzo, J. Cimentada, E. Del Fava, S. Gil-Clavel, and E. Zagheni. 2020. "Behaviors and attitudes in response to the COVID-19 pandemic: Insights from a cross-national Facebook survey. *medRxiv*.

Rotondi, V., R. Kashyap, L.M. Pesando, S. Spinelli, and F.C. Billari. 2020. "Leveraging mobile phones to attain sustainable development," *Proceedings of the National Academy of Sciences*.

Ruktanonchai, N.W., J.R. Floyd, S. Lai, et al. 2020. "Assessing the impact of coordinated COVID-19 exit strategies across Europe," *Science* 369(6510): 1465–1470.

Schmertmann, C., E. Zagheni, J.R. Goldstein, and M. Myrskylä. 2014. "Bayesian forecasting of cohort fertility," *Journal of the American Statistical Association* 109(506): 500–513.

Zagheni, E., R. Muttarak, and E. Striessnig. 2015. "Differential mortality patterns from hydrometeorological disasters: Evidence from cause-of-death data by age and sex," *Vienna Yearbook of Population Research* 47–70.

The Influence of the Covid-19 Pandemic on the Study of Macro-social Determinants of Population Health and Mortality

Zhongwei Zhao

Since its outbreak in Wuhan, China, Covid 19 has spread rapidly throughout the world. According to WHO, the number of confirmed cases reached 76.3 million and deaths 1.7 million globally by December 22, 2020 (WHO 2020). Unlike the SARS epidemic that affected about 30 countries and territories between late 2002 and early 2004, this pandemic and its aftermath will be with us for years. As one of the largest public health crises in human history (Goldstein and Lee 2020), the Covid-19 pandemic has profoundly changed the world and the lives of billions of people. As demographers what have we learned up to the present, and what can we do to improve our research and contribute to the war against the pandemic and the enhancement of population health?

Demography as an academic discipline began with the study of mortality when John Graunt's Natural and Political Observations Made upon the Bills of Mortality was published in 1662. (The bills were used initially to track potential plague epidemics, and later to record deaths.) This exemplifies how the need to control infectious diseases and interest in understanding mortality led to the development of demography and related modern sciences (Graunt 1662; Kreager 2003; Rowland 2003).

The early development of demography was driven largely by the study of mortality. Since the late nineteenth century, increasing attention has been focused on studies of population growth, fertility, migration, urbanization, and population aging (Caldwell 2003). Progress has also been made in the investigation of mortality, especially its changes, age patterns, sex differentials, and cause structure, as well as increasing longevity. In examining causes of mortality decline and their variations, efforts have been made mainly in quantitative analysis of the influence of micro-level factors. Impacts of macro-social determinants of health and mortality have been overshadowed, although there are exceptions (Caldwell 1986; Galea 2007).

Zhongwei Zhao, Australian National University.

https://doi.org/10.31899/pdr1.1015

Like Graunt's examination of the bills of mortality, the Covid-19 pandemic and the fight against it will greatly influence demographic research. They have, first of all, posed many new challenges and research questions. The urgent need to control the pandemic and its wide range of impacts have already become a powerful engine driving research development in many areas including demography. Furthermore, although it is a great tragedy in human history, the pandemic and especially the war against it have provided research opportunities that we have rarely seen before. This public health crisis has affected almost all countries and territories in the world, subject to the influence of varied natural environments and cultural traditions, as well as different social, economic, and political systems. Many governments have been heavily involved in controlling the pandemic and managing its damage and destruction. This new environment allows some crucial questions to be studied at an unprecedented scale. There have also been rapid developments in data collection and cross-discipline research collaborations. A flood of research on Covid-19-related topics has swept websites and journals (Else 2020, p. 553). With these in mind, I make some comments on the role of several macro-social determinants of population health in the fight against the pandemic and on how this may influence future development in demographic research.

Macro-social determinants of population health refer to social conditions that influence population health and mortality at the level of populations or large subpopulations. They include, for example, governance and government policy, social institutions and social structure, and social status of vulnerable populations (Galea 2007; WHO 2010). Impacts of macro-social determinants on population health and mortality are often indirect (in the sense they may not directly change people's health condition) and via (or through influencing) intermediate or intermediary determinants (Putman and Galea 2008; WHO 2010). Detailed examinations of influences of macro-social determinants have been limited in demography, partly due to the difficulty in quantifying them or disentangling them from other determinants.

A key macro-social determinant of health is governance, which is defined by the UN (UNDESA, UNDP and UNESCO 2012, p. 3) as "the exercise of political and administrative authority at all levels to manage a country's affairs. It comprises the mechanisms, processes and institutions through which citizens and groups articulate their interests, exercise their legal rights, meet their obligations and mediate their differences." The Covid-19 pandemic is an unprecedented test for governance throughout the world. Many national and local political and administrative authorities have made considerable efforts in managing the public health crisis. But outcomes have not been satisfactory in many countries. The spread of Covid-19 has not been contained since its first major outbreaks nearly a year ago. Many countries have now experienced

the second and even third wave of infection. The number of daily confirmed cases has reached a new high. Of course, the spread of the pandemic has been caused by many factors, especially those directly related to the asymptomatic infectiousness of the virus, and the limited effectiveness of prevention and control. Despite that, it is still important to ask the question of what role has been played by governance and other macro-social determinants.

There are significant variations in the effectiveness of controlling Covid-19 and some noteworthy experiences across populations. After it was struck severely by the first outbreak in Wuhan between January and March 2020, for example, China has by and large prevented another major surge in Covid-19 infection in a population of 1.4 billion (Leung et al. 2020; WHO 2020). This is confirmed by at least the following facts. First, hundreds of millions of Chinese traveled throughout the country during the May Day and National Day holiday periods, yet this was not followed by major outbreaks of new infection. Second, when China gradually reopened its universities after the pandemic was controlled, tens of millions of students returned to their classrooms and dormitories without a major increase in Covid-19 morbidity to date. In contrast, the number of confirmed cases continued to grow and reached more than 17.7 million in America between January 20 and December 22 (WHO 2020). Third, economic recovery in China has been speedy. In comparison with 2019, GDP increased by 0.7 percent in the first three quarters and 4.9 percent in the third quarter of 2020 (National Bureau of Statistics of China 2020).

The above discussion suggests a close link between governance and controlling the pandemic, but many questions about this link remain to be answered. For example, in countries struck by the second wave or suffering a prolonged outbreak, what is the extent to which these adverse developments are attributable to governance? What are the major obstacles that prevent more desirable governance from being achieved; for example, policies and strategies lacking scientific ground, indecisive or delayed actions, poor implementation of strategies, failure to obtain public support, or simply deficient resources and capacity? To systematically investigate these questions, we need more time and data. Diagnosing the underlying causes of different types of failure also requires cross-discipline collaboration. Demographers alone may not be able to answers all these questions, but they can make a major contribution.

Another macro-social determinant that is closely related to governance and demographic research is social institutions. They refer to clusters of behavioral rules governing "human actions and relationships in recurrent situations" (McNicoll 1994, p. 201), or "a complex, integrated set of social norms organized around the preservation of a basic societal value" (Sociology Guide 2020). Social institutions often vary across countries. One of their

essential features is their persistence, "generating a society's distinctive patterns of social organizations and the texture of social life" (McNicoll 1994, p. 201). They also help to define the rights and obligations of the government (or state) and citizens as well as their relationship in some societies. These make social institutions very relevant to the control of Covid-19 and efforts in improving population health.

Improving population health and mortality is largely about intervention. In addition to the development brought about by medical science and technology, this includes changing behavior or lifestyle by individuals and public health campaigns or programs launched by the government. When such actions are led or promoted by the government, what policy options are available and whether related intervention strategies can be implemented effectively are influenced strongly by social institutions. This is exactly what has been happening in the fight against Covid-19.

There were considerable debates on whether people should wear face masks when the Covid-19 infection started. Along with the worsening situation, the debates have also extended to whether border closures, curfews, or other stricter restrictions on social contacts and people's activities are needed or acceptable. These disputes arise from not only people's different knowledge about the necessity of these control measures or strategies, but also their contrasting views on whether the national government or local authority have the right or should be allowed to force people to accept them. Similarly, many governments have developed policies and plans to guide efforts against the pandemic, but there were considerable variations in their implementation across countries. Sometimes, similar policies and plans have led to very different results. These are at least partly attributable to the impact of varied social institutions and cultural traditions. Thus, tackling Covid-19 is not only about searching what is the most effective method to stop the spread of the virus, but more important, what is the most effective and acceptable way of controlling the infection in a particular population. Just as social institutions affected family planning and fertility changes (McNicoll 1980 and 1994), the experience of fighting the pandemic confirms that institutional impacts of a similar nature also exist in improving population health and lowering mortality.

Since the beginning of 2020, close to 200 countries and territories have developed policies and strategies to control the spread of Covid-19. Their implementation has been documented and analyzed (Hale et al. 2020). These provide a unique opportunity for a further investigation into the questions discussed above. This could considerably enrich our knowledge about the impact of social institutions on policy intervention and improving population health.

A further major macro-social determinant of population health is the social status of vulnerable populations (or how they are treated in society).

In the current pandemic, vulnerable populations mainly refer to people who have had greater susceptibility to Covid-19 and experienced more serious health consequences after being infected than the population at large, although those prone to the loss of livelihood or with hardship of other kinds may also be considered as vulnerable. Their vulnerabilities arise for different reasons. For some people, the vulnerabilities are caused by their physiological, demographic, or occupational characteristics (e.g., certain health conditions, being old, or having close contact with infected people). For others, the vulnerabilities are closely related to social or economic characteristics (e.g., refugees, temporary migrant workers, people in poverty or belonging to certain ethnic groups), which may considerably affect their social status (Andrasfay and Goldman 2020; Sánchez-Páez 2020). Higher Covid-19 incidence and mortality have been observed in some subpopulations during the pandemic, especially in its early stage (Koh 2020; Sobotka et al. 2020; Steiber and Muttarak 2020). But these subpopulations and their vulnerability levels vary notably across countries: due to differences in the level of initial preparation for the outbreak of the pandemic, the speed with which vulnerabilities in certain subpopulations have been identified, or the extent to which enhanced protection has been provided to vulnerable populations. Failing to help vulnerable people to protect themselves will worsen the socioeconomic and health inequalities that had already existed in pre-pandemic times and jeopardize the control of Covid-19 in the entire population. Consequences of this kind may be less observable in countries with higher levels of social equality and good social protection systems, but could be devastating in places where millions of people live in slums or a large number of refugees or temporary migrant workers are socially disadvantaged. Accordingly, additional efforts in monitoring new epidemiological developments and identifying vulnerable populations, and in efficiently controlling the spread of Covid-19 among them are crucial steps in overcoming the pandemic and further improving population health.

As indicated by many studies, a huge amount of data has been gathered since the outbreak of Covid-19, but much has not yet been used for in-depth studies of the pandemic, especially for cross-country comparative analysis. This is primarily due to the fact that these data have often been collected by researchers from different disciplines for different purposes and through different procedures. The data (e.g., causes of death, cases of Covid-19) may be recorded according to different criteria or subjected to the influence of varying registration problems. They therefore need careful documentation, evaluation, standardization, harmonization, and perhaps a necessary adjustment before being used more effectively in producing more reliable results. This is another area in which demographers and their expertise can make a major contribution.

Acknowledgments

I would like to thank Adrian Hayes and Terry Hull for their comments and suggestions on this commentary.

References

Andrasfay, Theresa and Noreen Goldman. 2020. "Reductions in 2020 US life expectancy due to COVID-19 and the disproportionate impact on the Black and Latino populations." *MedRxiv* Preprint. Accessed December 18, 2020. https://doi.org/10.1101/2020.07.12.20148387.

Caldwell, John C. 1986. "Routes to low mortality in poor countries," *Population and Development Review* 12: 171–219.

———. 2003. "History of demography." In *Encyclopedia of Population,* Paul Demeny and Geoffrey McNicoll (eds.), 216 –221. New York: MacMillan Reference.

Else, Holly. 2020. "Covid in papers: A torrent of science," *Nature* 588: 553.

Galea, Sandro (ed.). 2007. Macrosocial Determinants of Population Health. New York: Springer.

Goldstein, Joshua R. and Ronald D. Lee. 2020. "Demographic perspectives on the mortality of COVID-19 and other epidemics," *Proceedings of the National Academy of Sciences* 117: 22035-22041.

Graunt, John. 1662. *Natural and Political Observations Made upon the Bills of Mortality.* Walter F. Willcox (ed.), 1939. Baltimore: John Hopkins University Press.

Hale, Thomas, Noam Angrist, Emily Cameron-Blake, Laura Hallas, Beatriz Kira, Saptarshi Majumdar, Anna Petherick, Toby Phillips, Helen Tatlow, and Samuel Webster. 2020. "Variation in government responses to COVID-19," BSG-WP-2020/032 Version 8.0. Accessed November 10, 2020. https://www.bsg.ox.ac.uk/sites/default/files/2020-10/BSG-WP-2020-032-v8.pdf.

Koh, David. 2020. "Migrant workers and COVID-19," *Occupational & Environmental Medicine* 77: 634–636.

Kreager, Philip. 2003. "John Graunt." In *Encyclopedia of Population,* Paul Demeny and Geoffrey McNicoll (eds.), 472 –473. New York: MacMillan Reference.

Leung, Kathy, Joseph T. Wu, Di Liu, and Gabriel M. Leung. 2020. "First-wave COVID-19 transmissibility and severity in China outside Hubei after control measures, and second-wave scenario planning: A modelling impact assessment," *The Lancet* 395: 1382–1393.

McNicoll, Geoffrey. 1980. "Institutional determinants of fertility changes," *Population and Development Review* 6: 441–462.

———. 1994. "Institutional analysis of fertility." In *Population, Economic Development and the Environment.* Kerstin Lindahl-Kiessling and Hans Landberg (eds.), 199–230. Oxford: Oxford University Press.

National Bureau of Statistics of China. 2020. "Economic growth in the first three quarters turned from negative to positive." Accessed November 10, 2020. http://www.gov.cn/xinwen/2020-10/19/content_5552334.htm.

Putman, Sara and Sandro Galea. 2008. "Epidemiology and the macrosocial determinants of health," *Journal of Public Health Policies* 29: 275 –289.

Rowland, Donald T. 2003. *Demographic Methods and Concepts.* Oxford: Oxford University Press.

Sánchez-Páez, David A. 2020. "Effect of income inequality on the COVID-19 pandemic: Evidence from European countries." Poster presentation made at the Conference on Demographic Aspects of the COVID-19 Pandemic and its Consequences, Vienna, December 2020.

Sobotka, Tomáš, Zuzanna Brzozowska, Raya Muttarak, Kryštof Zeman, and Vanessa Di Lego. 2020. "Age, gender and COVID-19 infections." Presentation made at the Conference on Demographic Aspects of the COVID-19 Pandemic and its Consequences, Vienna, December 2020.

Sociology Guide. 2020. "Basic concepts and terms of sociology." Accessed November 15, 2020. https://www.sociologyguide.com/basic-concepts/Social-Institutions.php.

Steiber, Nadia and Raya Muttarak. 2020. "Occupational COVID-19 hazard in Austria: Are women really more exposed?" Presentation made at the Conference on Demographic Aspects of the COVID-19 Pandemic and its Consequences, Vienna, December 2020.

UNDESA, UNDP, and UNESCO. 2012. "Governance and development." Accessed November 5, 2020. https://www.un.org/millenniumgoals/pdf/Think%20Pieces/7_governance.pdf.

WHO. 2010. A Conceptual Framework for Action on the Social Determinants of Health. WHO: Geneva.

———. 2020. "Coronavirus Disease Dashboard." Accessed December 23, 2020. https://covid19.who.int/.