HEALTH, MORBIDITY, AND MORTALITY WORKING GROUP

European Association of Population Studies

BOOK OF ABSTRACTS

September 29–30, 2022

Charles University, Albertov 6, Prague 2

EAPS

VŠE / PRAGUE UNIVERSITY OF ECONOMICS AND BUSINESS

CHARLES UNIVERSITY
Faculty of Science

En – Epi – Pan – Demic, Reflections on Epidemiology

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In this paper we will try to clarify the differences between three concepts: endemic, epidemic, and pandemic. Looking at historical data, we shall try to define the boundaries of each of these concepts and the conditions under which an endemic becomes epidemic, epidemic becomes pandemic, and vice versa. We shall argue that the three are social phenomena as much as they are medical phenomena. Throughout history, only few en- epi- and pandemics were controlled by medical innovation. In most cases, contamination has been constrained by social change, be it on the individual, behavioral, level, or on the level of social structure and organization. As examples we shall present the cases of smallpox as compared to HIV and plague. Having established that en- epi- and pandemics are social phenomena, we shall explore the possibility of describing other human behaviors and attitudes in epidemiological terms.

Pandemic-related changes in the mortality trends in Europe: a new perspective of convergence?

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The study of convergence trends in mortality helps to define potential sources of improvement of the health status and survival in the population, to reveal the potential for future development, or to find more endangered regions where the aid or public policies should be targeted. It could be supposed that the recent pandemic of COVID-19 significantly affected many demographic trends, first of all the long-term mortality development. The long-term mortality development was highly determined by the political arrangement and division into "East" and "West" Europe. In Czechia, in the second half of the 20th century, the observed mortality trends corresponded to the development in the eastern part of Europe, i.e. the improvements were rather small and in some periods (1970s) there was only a stagnation. Some of the Eastern European countries suffered even from the mortality crises in the 1990s. At that time the Central European countries experienced a mortality improvement already. Despite the relatively worse position of the post-socialist countries in Europe, from the 1990s to the onset of the COVID-19 pandemics many of them reached a positive and promising trend of convergence to the western or northern parts of Europe. However, most of the post-socialist countries also belong to the group that was most severely affected by the pandemics. The study aims to evaluate the pre-pandemic mortality convergence trends in Europe and to compare them with the development in the pandemic years. The basic convergence trends are evaluated within the concept of sigma convergence working with selected measures of variability. Specifically, we used the Coefficient of variation squared and its decomposition into between and within-group components, and the calculation of contributions of particular countries to the overall variability of mortality in Europe. Except of the traditional approach when the variability is calculated using a selected mortality measure (e.g. life expectancy), we also analyzed the annual change of it. It was proved that the whole Europe was affected significantly by the COVID-19 pandemics, however, countries in the Western part quickly returned to the trend of mortality improvements. On the other hand, countries in the Central and above all Eastern parts suffered significant mortality worsening also in 2021.

Estimating National Excess Mortality in the Year of Covid, 2020

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As Covid progresses, it has become generally accepted that national data on the number of Covid related deaths are unreliable and incomparable and that the only way to compare the mortality effects of the pandemic in different countries is by considering total excess mortality. Simple as this may sound, there is no generally accepted method for estimating mortality as it might have been in the absence of Covid and hence, no accepted method for estimating what the excess is for 2020, given the reported number of deaths (or the rate) for that year. In this paper we shall argue that estimates based on extrapolation of mortality trends at the country level are insufficient. Instead, we shall argue for a multilevel extrapolation across all countries for which data are available. This will enable an estimate of the long-term trend in mortality rates, given population size and age structure (median age). We shall then consider the effects of social indicators on these trends and on the Covid-related excess. In particular, we shall consider: (a) material standards of living; (b) household structures; (c) group heterogeneity and materiel inequality; (d) political effects: form of government; welfare and redistribution policies.

Assessing growth rate discontinuity estimates of mass mortality

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Growth rate discontinuity modelling (GRDM) is an understudied technique for estimating the size of population shocks in low-data contexts. It projects exponentially within the intercensal interval containing a shock, allowing a one-time projection discontinuity that it attributes to the demographic impact, usually the death toll, of that shock. I provide the first review of GRDM's assumptions and previous uses. I also attempt to externally validate the method against independently well-characterised estimates of the death toll of the 1918–19 influenza pandemic. I find that GRDM requires high precision in its inputs to an extent rarely possible in historical and low-data contexts, especially at subnational levels. The areas of study in which GRDM's previous results have been very influential, namely the 1830s Trail of Tears, the 1864-70 Paraguayan War, the 1918-19 influenza pandemic, and the 1965-66 mass killings in Java, should reconsider the method's contributions to their fields.

Capturing the mode

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In the age of longevity increase, it is essential to have adequate measures to estimate the modal age at death. The mode is an essential indicator of longevity, mortality improvement at old ages, and for analyzing the shifting of mortality. Estimating the mode can, however, be difficult. The current methods for estimating the modal age at death are explored in this paper, as well as a new proposal for an estimation method for the mode. We showed that current methods for calculating the mode are not consistent over time and across them. Therefore, in this paper, we propose to use the Kernel Density Estimation approach to estimate the modal age at death since this method has no assumptions on the shape of mortality and preserves the mathematical properties of the mode.

How can human rights research inform pandemic studies?

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lDespite their different contexts, research on pandemics and research on armed conflicts face many similar methodological challenges. High levels of uncertainty in both contexts make even the most fundamental questions of how many people have been affected or died difficult to answer. The nature of pandemics and conflicts makes data collection difficult, resulting in data that is neither a complete enumeration nor a statistically representative sample of the population of study. Measurement and operationalization challenges are also present, such as how a civilian casualty is defined and how a death is attributed to Covid-19. In both fields, different data sources and methodologies can also present competing narratives about the events of interest in ways that are empirically difficult and politically contentious to disentangle. Here, we aim to bridge the pandemic studies literature with the literature on human rights statistics and communicate how the latter can strengthen the former. We consider three types of challenges experienced in research on pandemics—missing data, measurement difficulties, and contradictions in available data sources—drawing analogies to difficulties encountered in quantitative research on human rights. We also detail how multiple-systems estimation, a technique common in human rights research, could be used to address the persistent issue of death registration incompleteness biasing excess mortality calculations for the 1918 influenza pandemic.

Trends, changes and determinants of medical attention received before death among deceased adults in India: Evidence from pooled cross-sectional survey data (2004-2018)

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Background: India is coping an ageing population without an access to medical care services to all. Medical attention at death can improve the quality of causes of death data that required for policy intervention. The trends, changes and factors of receiving medical attention before death remain unknown. We examined the trends, changes, and determinants of medical attention received before death among deceased adults in India. Methods: Our study has used nationally representative pooled-cross-sectional survey data from2004 to 2017-18. We performed univariate, bivariate, and multivariate analyses. We examined the trends from 2004 to 2017-18. We estimated the absolute changes in medical attention rate (MAR) received before death by the 45+ deceased adults for the time period between 2004-2005 & 2017-2018 and 2014 & 2017-2018. Lastly, we applied binary logistic regression analysis to identify determinants of the medical attention received before death. Results: Our study has revealed that there has been a marginal increase (0.74%) in the overall trend in medical attention received before death among 45+ adults from 2004 to 2017-18. Females, rural residence are showing reduction in receiving medical attention. However, our finding has showed that young-old, middle-old and oldest-old have significantly lower odds of receiving medical attention compared to middle-aged adults. Surprisingly, our result has revealed that Southern and Western regions are found to have significantly less likely to receive medical attention before death among deceased adults which is a striking finding. Conclusions: There is huge disparity across socio-economic characteristics and regions in receiving medical attention before deaths.

Pandemic-related stressors and depressive symptoms increase in elderly population: evidence from Czech cohort study using repeated assessments

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Background: Recent studies have suggested that the COVID-19 pandemic resulted in negative mental health changes but only minority of studies focused to assess changes in mental health against measurements taken before the pandemics. We investigated a change in depressive symptoms using repeated measurements and the impact of the pre-existing and pandemic-related stressors in an ageing cohort in the Czech Republic. Methods: We used data on 2853 participants (mean age 73.4 years) from the Czech part of the prospective HAPIEE cohort that participated on postal questionnaire surveys before (2017) and during the pandemic (autumn 2020 to early 2021). Participants reported their depressive symptoms using validated CESD-10 report tool. The impact of pre-existing socio-demographic stressors and financial, social and health stressors related to COVID-19 pandemic on change in depressive symptoms were tested using multivariable linear regression, after adjustment for age and potential confounders. Results: Compared with pre-pandemic period, there was a significant increase in depression score during the COVID-19 pandemic. The mean CESD-10 score increased from 4.92 to 5.37 (p<0.001). Significantly larger increases in depressive score reported older people (β=0.073; p<0.001) and those with poor self-rated health (β=0.170; p<0.001) in the fully adjusted model. Moreover, those who experienced death or hospitalization of a close person (β=0.064; p<0.001), social deprivation (β=0.057; p<0.001), delays in healthcare (β=0.048; p=0.005) and those who suffered from COVID-19 (β=0.045; p=0.008) also reported larger increase in depression score. Conclusion: This longitudinal study confirms important increase in depressive symptoms during the COVID-19 pandemic and contributes to identify pandemic-related determinants. Interventions and future public health policies should address vulnerable individuals and population groups.

Cause-specific mortality in Spain before and during the pandemic: educational differences and its impact on life expectancy using multiple causes of death data

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While research on the impact of COVID-19 on life expectancy in Spain is already well-covered, little is yet known on its impact on causes of death, especially from a multiple cause-of-death (MCOD) perspective. Likewise, the study of educational differences in life expectancy has also attracted attention over the last decade, but its role in COVID-19 related mortality has not yet been investigated. We, therefore, propose to analyse the impact of COVID-19-related mortality in Spain on life expectancy differences by educational level from a MCOD approach. We will use multiple cause-of-death (MCOD) mortality data and population data for Spain (2018–2020) by age, sex, and educational attainment from the Spanish National Statistics Institute. We will first compare, also by educational attainment, the distribution of the main causes of death in 2020 with the previous two years by selecting COVID-19 (ICD10 U07.1, U07.2) as both the underlying cause of death (UCOD) and MCOD. To this end, we will also analyse COVID-19 deaths alongside the most common conditions that were also reported on the death certificate, including lung cancer, selected respiratory diseases, dementia and Alzheimer, selected circulatory system diseases and symptoms and signs not classified elsewhere. This is to ascertain whether COVID-19 has led to an increase in comorbidity. We then estimate changes in life expectancy between 2018/19 and 2020 by cause-specific contributions according to age groups and educational attainment. Finally, we estimate educational inequalities in COVID-19-related mortality using the absolute and relative inequality measures RII and SII.

Ill and still working? Working life expectancy with and without cardiovascular diseases between 2005 and 2019 based on health insurance data from Germany

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Introduction: Against the backdrop of rising life expectancy in Germany the statutory pension system is facing the challenge of covering the required pension expenditures for the population. One of the measures to deal with this challenge was the increase of the retirement age. The question arises whether working life expectancy (WLE) actually increased and whether these additional years in labour are spent in good health regarding the absence of cardiovascular diseases (CVD). We analysed, how WLE and CVD-free WLE developed over time. Methods: This study is based on data of the statutory health insurance provider AOK Niedersachsen (N=3,328,369) covering 37% of inhabitants in Lower Saxony, Germany. Data contain detailed information on labour force status and CVD diagnoses for persons aged 18 and above. WLE and CVD-free WLE will be calculated based on multistate life tables. Trends will be analysed comparing three time periods: 2006-2008, 2011-2013, and 2016-2018. Results: WLE increased clearly over time, with increases being stronger in women (at age 18: +2.5 to 38.3 years in men, +6.5 to 34.0 years in women). Preliminary analyses show decreases in incidence of coronary heart disease, myocardial infarction and stroke over time for both men and women. The incidence of cardiac insufficiency decreased slightly for women, but not for men. Conclusion: Similar analyses for cancer showed an increase in cancer free WLE depending on the age of the individuals. If CVD-free WLE increases at a slower pace than total WLE, decreasing proportions of years in labour are spent free of CVD. This possible increase in burden of CVD among labour force – especially if it applies to higher working age – would most probably lead to higher morbidity after passing the retirement age. The implications for the health care system and for the society will be discussed.

Remembering the Dead: Estimates of Excess Mortality during the COVID-19 pandemic from panel study in Delhi-NCR

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Assessing the number of deaths during the ongoing COVID-19 pandemic has given rise to a number of diverging estimates, opinions, debate and controversy. India has been a hotbed of these debates recently with the Indian Government objecting to the World Health Organization's model based estimate of 14.9 million excess deaths in the years 2020 and 2021. A review of the available literature suggests excess deaths ranging between 2-15 million deaths during the pandemic compared to the official toll of nearly 530,000 deaths in the country. We add to this literature by presenting results on estimates of excess deaths during the pandemic leveraging primary data from a representative, panel survey conducted before the pandemic and post the severe delta wave (wave-2) in the country. Our results suggest that while excess mortality has indeed increased during the pandemic period, the estimates in the endline round post wave-2 range between 25-40% over the pre-pandemic baseline crude death rate, significantly lower than the studies conducted till date. We also find that while age distribution of the dead members is skewed towards the elderly and a sharp increase in intra-household deaths – both indicating the possibility of death due to COVID-19. The comparatively lower estimates of excess mortality that we find can be explained by the fact that while COVID-19 deaths have indeed contributed to an increase in excess mortality, non COVID-19 deaths such as Road Accidents, Pre-term births which rank highly among the causes of deaths in India have decreased significantly during the pandemic period partly due to non-pharmaceutical interventions (NPIs) such as lockdowns. In the full version, we plan to validate our results with spatial analysis of official COVID-19 diagnostic numbers and examine the patterns of geographic contiguities in deaths which would further strengthen our findings.

Implications of rising female reproductive-age mortality for fertility in the United States, 2010–2019

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Recent increases in female reproductive-age mortality in the United States (U.S.) imply that fewer women lived to bear children than would be expected had mortality stayed constant. We apply a cohort component projection model with alternative specifications to counterfactually estimate the impact of changes in female reproductive-age mortality on fertility in the period 2010–2019. We estimate the number of live births if (1) female mortality in the observation period had changed under three alternative scenarios, and, separately, if (2) age-specific fertility rates had remained constant after 2010. We find that fertility in the U.S. would have been higher had female all-cause mortality between ages 12 and 55 not increased after 2010, or if the U.S. had experienced European patterns of female reproductive-age mortality. For each cause of death, the number of children that would have additionally been born depends on the magnitude and timing of changes in female reproductive-age mortality and the average age at death. Thus, increases in drug overdose- and suicide-related mortality have had the strongest implications for U.S. fertility. However, we conclude that changes in women's reproductive patterns have had much larger consequences for fertility than simultaneous changes in female reproductive-age mortality. While our study focuses on non-pandemic mortality increases, our research serves as important groundwork for COVID-19-related research, which will have to consider how fertility has changed as a result of both the pandemic itself and the exponentially higher rates of mortality during it.

Inequality in mortality by causes of death: application of the Gini coefficient

Suryakant Yadav

Developed countries manifest that low disparity in lifespan is the key to advances in epidemiological transition that has been achieved by the reducing burden of chronic noncommunicable diseases (NCDs) in adult through middle ages. Contrarily, India shows a heavy burden of NCDs responsible for the high disparity in lifespan. The Gini coefficient was decomposed for examining the contribution of 21 causes of death and their repercussions for inequality in age at death for 30 years between 1990-1994 and 2015-2019, using Global Burden of Disease data. The results reveal that, by causes of death, respiratory infections and tuberculosis, and enteric infections contributes significantly in infant through middle ages to e0 as well as G0. These causes of death confirm for a shift as well as the transformation in the distribution of age at death. On the other hand, cardiovascular diseases and chronic respiratory diseases at old ages showed small contribution to e0 and conventional negative contribution to G0 and rather did not contribute in adult through middle ages. It confirms an insignificant role of chronic NCDs for a shift as well as transformation in age at death. Contribution at old ages at the most can have a benign effect on G0; notwithstanding, insignificant contribution at adult and middle ages indicates a large premature mortality caused by chronic NCDs. Compared to developed nations, India lacks the structural changes in causes of death and a significant contribution in the adult and middle age groups responsible for large premature mortality.

Causes of deaths diversity indicators: an assessment of potential uses and limitations

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In the last two centuries, most countries have been progressively advancing in the epidemiological transition, characterized by the changes in the morbidity and mortality profile. However, some countries have experienced a juxtaposition of stages since they face various obstacles to improving population health conditions. As a result, these countries have significant causes of death diversity (Cod Diversity). On the other hand, low mortality countries have also shown a slight increase in mortality diversification over the last 20 years due to the reduction in the dominance of cardiovascular diseases. Traditional mortality indicators, such as life expectancy and lifespan inequality used to summarize mortality curves, are relevant for a broader understanding of the mortality transition and allow comparisons between different regions, countries, socioeconomic groups, and over time. However, few studies use summary measures to mortality diversity in terms of causes of death. The objective of this paper is to evaluate the potentiality of using various diversity indicators (i.e., Shannon Entropy, Fractionalization index, Inverse Simpson index, Gini-Simpson index, Berger-Parker index) for the analysis of the CoD diversity as well as the use of techniques to decompose the contribution of each of the causes to variations in CoD diversity indicators over time. Preliminary results show that the diversity indicators are highly correlated with each other, with similar temporal trends and regional patterns. It is also interesting that Cod diversity is strongly correlated with life expectancy and lifespan inequality but in a non-linear relation over time. Therefore, we believe that using diversity indicators for CoD diversity has much potential and can help in the broader understanding of the epidemiological transition. However, the choice of the indicator should be made with caution since the assumptions of some indicators may not fit well with each study.

How effective are gender-based registered deaths in India? Evidence from recent National Family Health Survey-5 (2019-2021)

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Background: Death registration data in many developing countries, including India, are inadequate, incomplete, and out of date, undermining their effectiveness. However, there is a paucity of research on registered deaths in India. Therefore, we intend to investigate how gender-based socio-economic and demographic factors impacting the registered deaths in India at national and subnational levels. Data: The National Family Health Survey-5 provides information on population, health, and nutrition for India and each state and union territory conducted in 2019-2021. It is under the stewardship of the Ministry of Health and Family Welfare, Government of India. The survey includes questions on deaths in the household in the last three years, individual information on the deceased, household level information and whether the death was registered in the civil registry or not. Methods: We performed univariate, bivariate and multivariate analysis. We calculated the absolute gender gaps in registered and non-registered deaths and then we used binary logistic regression analysis to examine the risk factors for registered deaths. Results: The overall absolute gender gap in registered deaths in India was found to be 8.87%. Females, infants, rural-residence, Muslims, Christians, schedule-caste, schedule-tribe, other-backward-caste, North-eastern, Central and Eastern regions all had significantly lower odds of registering deaths with the civil authority. Deaths due to external causes, non-nuclear HH-structure, and Western region had significantly greater odds of being registered deaths. With an increase in the wealth index of the household, the odds of registering deaths also increased. Conclusions: There is a huge and glaring gender bias in the registered deaths. In order to reduce the significant gender gap in registered deaths, the Indian government should make an effort to invest on complete death registrations, particularly among females and infants.

International Completeness of Death Registration 2015-2019

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Death registration completeness, the share of deaths captured by countries' vital registration systems, vary substantially across countries. Estimates of completeness, even recent ones, are outdated or contradictory for many countries. In this paper, I collected the annual amount of deaths registered in 179 vital registration systems around the world and contrasted them with standard estimates of expected deaths in order to derive the most up-to-date and consistent estimates of death-registration completeness from 2015 to 2019.

Illiberalism or neoliberalism? COVID-19 pandemic management and public discourse in Hungary

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This study compares Hungarian pandemic management to that of the neighbouring countries using the Policy Responses Indicators of the Our World in Data website. Additionally, we map the public discourse on pandemic management by analysing the content of news appearing in the two most popular Hungarian online news sites (24.hu, index.hu). Using the policy response indicator we found "loose" pandemic management in Hungary especially in regard to cancellation of public events, testing, contacts tracing and workplace mobility. Public discourse on pandemic management was overshadowed by the political divide between the government and the opposition, and was focused on different issues in the different waves. In the first wave, the introduction of the "emergency law" and health care sector reorganization, in the second, testing and the economic impacts of possible lockdown measures were in the focus. In the third, economic concerns and vaccination issues, while in the fourth, evaluation of the pandemic management during the previous waves dominated the discourse. Talking heads from the side of the government (The Chief Public Health Officer, the Prime Minister, other ministers and medical experts) were more numerous than from the opposition side (political leaders, independent medical and other experts). Representatives of various economic interest groups also appeared frequently. Regarding trade unions, only one of them (the allowance of the unions of education) was active and achieved some limited results. The pandemic response indicators prove the weakness of the health- and especially the public health sector, the deficiencies of the central governance, and weakening status of labour rights. The underrepresentation of labour issues in the news is also evident. Altogether, these weaknesses are the result of the neoliberal polices that has been long characterizing Hungary and continued so during the pandemic times, contributing to the high death toll of the pandemic.

Can we accurately compare the mortality due to influenza to that due to Covid-19?

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In the last recent years, before the Covid-19 pandemic, influenza-attributable mortality has been impressive, mainly among the elderly. A wide variability between different countries, seasons, and years was observed. Last seasons, characterized by Covid-19 pandemic, showed a sharp decrease in influenza activity. Italy has been the first western country hit by the Covid-19 pandemic, with the first documented case reported on February 18th,2020. In the last two years the attention has been focused on the Covid-19 pandemic. Many scholars have tried to compare the mortality attributable to influenza with that due to Covid-19, but comparisons were mainly based on the case fatality rate (CFR) for Covid-19, the ratio of confirmed deaths to confirmed cases, which varies widely between countries. The CFR is a poor measure of the mortality risk of the disease, especially for diseases whose severity varies widely with a large share of asymptomatic or pauci-symptomatic cases. A valid comparison should be done by comparing the infection fatality rates (IFR), the probability of dying for a person who is infected, whose estimation is quite challenging without a consolidated surveillance system. IFR depend on the infectious dose, the population structure, the case-mix of infected and deceased individuals and other, local factors. The estimation of mortality due to influenza is challenging as well, and a variety of methods have been proposed. A comparison between influenza and Covid-19 IFR can be tentatively made considering a fixed period in the same geographical context. The study aims at comparing the IFR for Covid-19 in the winter season from week 42/2020 to week 17/2021 to that for influenza in the last 10 years in Italy by using a Poisson regression time-series model. Preliminary results revealed a IFR for Covid-19 of 1.1%, that is 2.4 times larger than that for influenza observed in the peak season 2016/17.

A critical review of the 1918-20 influenza pandemic death toll in the Americas

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In the last two decades, the academic understanding of the 1918-20 influenza pandemic has improved greatly, but the Americas' experience of the pandemic has not been significantly inserted into the emerging global narrative. The two most commonly cited estimates for the global death toll of the pandemic barely incorporate any data from the Americas, especially from Latin America. This is despite the significant, and in some ways, world-leading, research of scholars of Latin America into the pandemic. In this paper, I work to summarize and analyze the published research on the pandemic's death toll throughout the Americas. In doing so, I discuss how well the literature adheres to best practices, e.g. using excess mortality methods, applying corrections for death registration incompleteness, and paying attention to the disproportionate and undercounted mortality faced by indigenous and other marginalized groups. In doing so, I hope to summarize both what the extensive literature on the pandemic in Latin America can tell the global community about the pandemic's death toll and how scholars can work to expand that literature.