Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

of cancer associated with diabetes and develop effective preventive strategies to minimise the cancer incidence and death in individuals with diabetes.

I declare no competing interests.

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1 Litwak L, Goh SY, Hussein Z, Malek R, Prusty V, Khamseh ME. Prevalence of diabetes complications in people with type 2 diabetes mellitus and its association with baseline characteristics in the multinational A1chieve study. *Diabetol Metab Syndr* 2013; **5:** 57.

2 Ling S, Brown K, Miksza JK, et al. Association of type 2 diabetes with cancer: a meta-analysis with bias analysis for unmeasured confounding in 151 cohorts comprising 32 million people. *Diabetes Care* 2020; **43:** 2313–22.

3 Pearson-Stuttard J, Zhou B, Kontis V, Bentham J, Gunter MJ, Ezzati M. Worldwide burden of cancer attributable to diabetes and high body-mass index: a comparative risk assessment. *Lancet Diabetes Endocrinol* 2018; **6:** e6–15.

4 Song M, Vogelstein B, Giovannucci EL, Willett WC, Tomasetti C. Cancer prevention: molecular and epidemiologic consensus. *Science* 2018; **361:** 1317–18.

5 Pearson-Stuttard J, Bennett J, Cheng YJ, et al. Trends in predominant causes of death in individuals with and without diabetes in England from 2001 to 2018: an epidemiological analysis of linked primary care records. *Lancet Diabetes Endocrinol* 2021; published online Feb 4. https://doi.org/10.1016/S2213-8587(20)30431-9.

6 Rhee JJ, Mattei J, Hughes MD, Hu FB, Willett WC. Dietary diabetes risk reduction score, race and ethnicity, and risk of type 2 diabetes in women. *Diabetes Care* 2015; **38:** 596–603.

7 Kang JH, Peng C, Rhee JJ, et al. Prospective study of a diabetes risk reduction diet and the risk of breast cancer. *Am J Clin Nutr* 2020; **112:** 1492–503.

8 Hu Y, Zhang X, Ma Y, et al. Incident type 2 diabetes duration and cancer risk: a prospective study in two US cohorts. *J Natl Cancer Inst* 2020; published online Sept 16. https://doi.org/10.1093/jnci/djaa141.

9 Pernicova I, Korbonits M. Metformin—mode of action and clinical implications for diabetes and cancer. *Nat Rev Endocrinol* 2014; **10:** 143–56.

10 Higurashi T, Hosono K, Takahashi H, et al. Metformin for chemoprevention of metachronous colorectal adenoma or polyps in post-polypectomy patients without diabetes: a multicentre double-blind, placebo-controlled, randomised phase 3 trial. *Lancet Oncol* 2016; **17:** 475–83.

Avoiding a legacy of unequal non-communicable disease burden after the COVID-19 pandemic

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2020 was a difficult year for health. The COVID-19 pandemic brought a widespread but deeply unequal health burden, etched along racial and ethnic lines, reflecting longstanding socioeconomic inequalities. As the pandemic swept the world, these inequalities became differences in exposure to the virus and differences in pre-existing non-communicable disease (NCD) burden associated with an increased risk of severe COVID-19. The confluence of these factors—the spread of a novel infectious agent, the prevalence of NCDs that exacerbated disease severity, and the patterns of social inequality underpinning both—have led to the apt description of COVID-19 as a syndemic.

When we speak of the unequal impact of the COVID-19 pandemic, we are usually referring to differences in COVID-19 outcomes. However, it is becoming increasingly clear that the inequitable health consequences of the pandemic run deeper than COVID-19-related morbidity and mortality alone. In the short-term, these have included non-COVID-19 mortality increases for heart disease, diabetes, and dementia,[1] substantial declines in mental health outcomes, particularly for those with the least assets,[2] and cancellations of elective surgeries, including those for urgent cancer care.

As we enter 2021, we are now facing the risk that the health inequities wrought by COVID-19 will have long-tail, greater consequences for the burden of NCDs for decades to come. COVID-19 was accompanied by a recession in many countries, occasioned by the economic fallout from the spread of the virus and efforts to contain it. This burden was not shared equally, and there is ample evidence that the COVID-19 recession has widened socioeconomic gaps.[3]

Since so much of health is socially determined, and the NCD burden is borne disproportionately by those with access to fewer salutary resources, the longer-term consequences of the pandemic on social inequality[3] stand to lead to more NCDs among those groups already facing comparatively high levels of morbidity and mortality. In other words, social inequalities led to a disproportionate NCD burden that worsened COVID-19, and COVID-19 is worsening social inequalities that will, if we fail to act, lead to a greater and more disproportionate NCD burden. In some cases, policy choices might exacerbate these effects. Importantly, in the COVID-19 moment, vaccine distribution choices offer the opportunity to acknowledge these disparities by prioritising marginalised groups with higher COVID-19-relevant NCD comorbidity burdens, or risk disproportionately favouring high-income groups in better health within each age cohort.

Panel: **Recommendations for avoiding a legacy of unequal NCD burden from the COVID-19 pandemic**

- Improve the use of data in monitoring and predicting the long-tail effects of social determinants on the prevalence of non-communicable diseases (NCDs)
- Prioritise the health needs of marginalised groups on the basis of such data and predictions
- Embed these insights in real-time decision-making and accountability frameworks to reduce the inequitable burden of NCDs

The role of physical-distancing policies, particularly in their effects on unemployment and schooling, merit particular consideration in this regard. In the USA, the employment rate among high-wage (>US$60 000 per year) workers has largely recovered to pre-pandemic levels, while the rate among low-wage (<$27 000) workers remains 20% lower than in 2019.[4] Involuntary job loss has been associated with a more than doubling of risk of subsequent stroke,[5] a reduction in attendance for necessary medical examinations,[6] and increasing levels of alcohol and substance abuse.[7] These risks compound existing inequalities in health, as African Americans and Hispanic or Latino Americans, who already have shorter life expectancy and poorer population health overall due to longstanding socioeconomic disparities, are also overrepresented among the recently unemployed.

For more on the **US employment rate** see https://www.tracktherecovery.org

The disruption to education outcomes similarly exacerbates existing inequalities, with long-term implications for NCDs in particular. Students from Black, Hispanic, and Indigenous communities in the USA have disproportionately fallen behind in their academic achievement as a result of school closures.[8] Participation in online maths coursework and documented student progress in maths are about 20% lower among low-income families compared with before the pandemic.[4] Over the longer term, differences in educational attainment are associated with substantial differences in adult mortality.[9] The European Centre for Disease Prevention and Control released a summary of the evidence on school closures, and, beyond disruptions in learning, notes a range of health impacts, disproportionately large for children who were already marginalised or vulnerable. These health impacts include increased anxiety and depression, increased risk of domestic violence, decreased nutrient intake, and increased food insecurity.[10]

These examples suggest that both the pandemic and some of the measures adopted to contain it are exacerbating future health inequalities and could increase NCD health gaps for years, and even decades, to come. COVID-19 has demonstrated both the crucial role of prevention, and, when prevention fails, the unacceptable high cost in lives and overburdened health systems that follows. How then do we act to prevent the long-term NCD-related consequences of the pandemic? We suggest that the moment calls for three approaches (panel).

First, social inequality has been at the core of poor health pre-COVID, is reflected in inequalities in health outcomes during the pandemic, and will continue to be the driving force of NCDs in its wake. It therefore seems clear that the social determinants of health must be considered as foundational to NCD prevention and centrally embedded in government policy at all levels. This approach will require difficult decisions to be made that balance the urgency of managing COVID-19 with the importance of addressing the social determinants that will otherwise be exacerbated by it.

Second, we need access to better data to monitor the social determinants of health and their effects. Monitoring the changes in society and inequality that COVID-19 is exacerbating is a crucial means of predicting the downstream consequences for NCDs. This approach will require efforts at the intersection of data science and social determinants, including expansion of the definitions of health data to better include measures of social inequality, consideration of ways in which existing data are being underutilised, and the development of predictive models of future disease burden that take these data into account.

Third, these data must be embedded in real-time, accountable decision making that seeks to act to mitigate these disparities. The convergence of forces that constitute the social determinants of health requires a convergence of decision makers with a collective responsibility to reduce future health burdens, informed by data on the foundational causes of health. This approach will by necessity include honest interrogation of the decisions made now to mitigate the pandemic in ways that acknowledge the long-term consequences of worsening inequalities with respect to NCD burden.

The full burden of the COVID-19 pandemic remains to be revealed, but it is clear that the health burden of the pandemic is not being equally felt. Inequalities in NCD

burden contributed to COVID-19 health inequities, and the consequences of efforts to mitigate COVID-19 stand to further widen NCD gaps. It falls to us as researchers and policy makers to act quickly to centre the role of social determinants in health production, through faster, more responsive data collection, and to use those data to inform decision making that aspires to narrow NCD health gaps in the years and decades to come.

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1 Shiels MS, Almeida JS, García-Closas M, Albert PS, Freedman ND, de González AB. Impact of population growth and aging on estimates of excess U.S. deaths during the COVID-19 pPandemic, March to August 2020. *Ann Intern Med* 2020; published online Dec 15. https://doi.org/10.7326/M20-7385.

2 Ettman CK, Abdalla SM, Cohen GH, Sampson L, Vivier PM, Galea S. Low assets and financial stressors associated with higher depression during COVID-19 in a nationally representative sample of US adults. *J Epidemiol Community Health* 2020; published online Dec 4. https://doi.org/10.1136/jech-2020-215213.

3 Bambra C, Riordan R, Ford J, Matthews F. The COVID-19 pandemic and health inequalities. *J Epidemiol Community Health* 2020; **74:** 964–68.

4 Chetty R, Friedman JN, Hendren N, Stepner M, Opportunity Insights Team. The economic impacts of COVID-19: evidence from a new public database built using private sector data. https://opportunityinsights.org/wp-content/uploads/2020/05/tracker_paper.pdf (accessed Dec 28, 2020).

5 Gallo WT, Bradley EH, Falba TA, et al. Involuntary job loss as a risk factor for subsequent myocardial infarction and stroke: findings from the Health and Retirement Survey. *Am J Ind Med* 2004; **45:** 408–16.

6 Kentikelenis A, Karanikolos M, Papanicolas I, Basu S, McKee M, Stuckler D. Health effects of financial crisis: omens of a Greek tragedy. *Lancet* 2011; **378:** 1457–58.

7 Nagelhout GE, Hummel K, de Goeij MCM, de Vries H, Kaner E, Lemmens P. How economic recessions and unemployment affect illegal drug use: a systematic realist literature review. *Int J Drug Policy* 2017; **44:** 69–83.

8 McKinsey & Company. COVID-19 and learning loss—disparities grow and students need help. McKinsey & Company, 2020. https://www.mckinsey.com/industries/public-and-social-sector/our-insights/covid-19-and-learning-loss-disparities-grow-and-students-need-help (accessed Dec 28, 2020).

9 Rogers RG, Everett BG, Zajacova A, Hummer RA. Educational degrees and adult mortality risk in the United States. *Biodemography Soc Biol* 2010; **56:** 80–99.

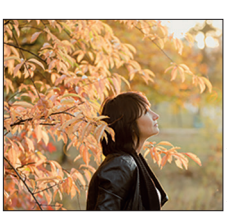
10 European Centre for Disease Prevention and Control. COVID-19 in children and the role of school settings in transmission—first update. Stockholm: European Centre for Disease Prevention and Control, 2020. https://www.ecdc.europa.eu/en/publications-data/children-and-school-settings-covid-19-transmission (accessed Dec 28, 2020).

Menopause transition: a golden age to prevent cardiovascular disease

Ischaemic heart disease and stroke are the world's leading cause of death in both men and women according to WHO's Global Health Estimates in 2019.[1] The 2011 American Heart Association guidelines[2] for cardiovascular disease prevention in women addressed common and female-specific risk factors and significantly raised awareness of the sex differences relevant to diagnosis and treatment. Since then, many advances have been made on the important role of reproductive milestones and disorders that are unique to women, including the menopausal transition—a biopsychosocial turning point in the prevalence of cardiovascular disease risk.[3,4] At the end of 2020, a scientific statement by El Khoudary and colleagues,[5] on behalf of the American Heart Association, includes for the first time the menopausal transition as a sex-specific event that profoundly affects future cardiometabolic health (panel). The focus of this American Heart Association scientific statement on the menopausal transition is valuable because this is a time in a woman's life when dramatic endocrine and metabolic modifications ensue, the pathophysiological basis of which are largely unclear. In addition, the trajectory of the menopausal transition is variable in each woman; emerging data suggest that a number of clinical and biochemical parameters pinpointing the personal modality of the transition might serve as predictors of future cardiometabolic risk.

On the basis of longitudinal studies it is now evident that endocrine changes and menopausal symptoms, in particular vasomotor symptoms, sleep disorders, and mood changes are related to adverse modifications in cardiovascular health independently from chronological ageing.[5,6] Racial and ethnic background also strongly influence the menopausal transition experience of middle aged women.[6]

Several cardiometabolic health parameters change simultaneously during the menopausal transition, including a sharp increase in blood lipids (total cholesterol, low-density lipoprotein C, and apolipoprotein B), a weakening of the anti-atherogenic function of high-density lipoprotein C, a progressive fat accumulation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