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To: Audrey Ceschia, Editor in chief, Lancet Public Health

Dear Dr. Ceschia,

Enclosed please find our manuscript “**Estimating the burden of COVID-19 on mortality, life expectancy and lifespan inequality in England and Wales: A population-level analysis**” for consideration as **original research article** for Lancet Public Health.

Accurate population-level estimates of the burden of excess mortality during the COVID-19 pandemic are crucial for understanding the impact of the pandemic and to plan for ongoing mitigation efforts in the UK to prevent a second peak. Prominent media accounts have highlighted the significant toll of COVID-19 in terms of excess mortality during the pandemic in the UK and noted it as the worst performer in Europe. These accounts however are based on crude methods that do not account for important biases such as age structure and seasonal trends in mortality, nor do they provide any estimate of uncertainty. These approaches also do not analyse variations by age and sex, and do not assess the cumulative impact of the pandemic through its effect on widely-used population health indicators such as life expectancy.

Our paper is the first to our knowledge to use state-of-the-art demographic models to estimate cumulative population health impacts of the COVID-19 pandemic in England and Wales through a systematic assessment of excess mortality, life expectancy and lifespan inequality. While attempts at estimating excess mortality attributable to the COVID-19 pandemic have recently been published in *JAMA Internal Medicine* for the US, no work has so far systematically estimated the mortality burden in the context of England and Wales.

Demographers have historically calculated excess mortality during natural disasters or other times when cases attributable to specific causes may be unreliable. Excess mortality measures deaths that occur above and beyond the number that would have been expected based on patterns from recent years. Our paper uses demographic model-based approaches to estimate excess mortality in England & Wales during the first half of 2020 and provides estimates of uncertainty associated with these. We estimate there have been 53,937 (95% Prediction Interval: 53,092, 54,746) excess deaths in the first half of the year, compared to 49,607 number of deaths where COVID-19 was mentioned. This represents a 31% increase in mortality compared to expected levels.

These excess deaths vary significantly by age and sex. Excess deaths in the 15-44 age group were only 6.1% higher than expected levels, while this rose to 36.8% higher than normal for those 85 and older. Men experienced elevated risks of death in all age groups, and comprised 54% of the excess death observed.

We also calculated the impact of the COVID-19 mortality on life expectancy in England and Wales for 2020. We find that life expectancy at birth has already dropped 1.7 and 1.9 years for females and males relative to the 2019 levels, respectively. To put this loss into perspective, current life expectancy levels as a result of the pandemic have regressed to those observed in 2008. This is a staggering number from a concentration of excess deaths in only 2-3 months; resurgence of the pandemic in the same year could lead to even more dramatic losses in life expectancy.

Our findings demonstrate the deep impact of COVID-19 thus far on mortality in England & Wales and highlight the urgent need to put in place public health responses to prevent a second peak that will worsen the mortality impacts.

Many thanks for your consideration.

Sincerely,

Jose Manuel Aburto, PhD and Ridhi Kashyap, DPhil, on behalf of the authors.