

**Title: Importance of population-based longitudinal studies to understanding the impact of COVID-19**

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High-quality population-based surveillance studies such as the COVID-19 Infection Survey ([CIS](#)) and Real-time Assessment of Community Transmission ([REACT](#)) Study primarily serve the purpose of generating timely and accurate estimates of the COVID-19 infection and transmission rates. But describing the evolution of the COVID-19 pandemic is a different objective from understanding its multidimensional impact on people's lives and describing the post-COVID-19 longer-term trajectories of the population. Surveillance studies can neither be used to study the COVID-19 period effect within life course and ageing perspectives nor be informative about a multitude of COVID-19-related impacts and implications beyond the short-term health impact.

Against this backdrop, multidisciplinary population-based longitudinal studies can substantially add to our knowledge of the COVID-19 pandemic and its impact. In the UK, many population-based longitudinal studies have only recently incorporated serological tests, and this impedes their ability to provide accurate estimates of COVID-19 status over the entire pandemic period. However, there are important dimensions of the COVID-19 pandemic that population-based longitudinal studies are well placed to study. Below I discuss some of these dimensions.

**i) The dimension of time**

The COVID-19 pandemic has short-, medium- and long-term implications. To fully understand them, one needs rich data that cover the COVID-19 period. They also need an appropriate pre-COVID-19 comparison basis; that is data about how the population was doing before COVID-19. In the UK, several high-quality population-based longitudinal studies offer such data. For example, the English Longitudinal Study of Ageing ([ELSA](#)) has collected rich individual-level health, behavioural and social data from a representative sample aged  $\geq 50$  years over a period of 20 years, from 2002 to today. These data can be used to study the effect of COVID-19 pandemic on older people's lives and health in a much fuller way.

Regarding the future, the experience and legacy of COVID-19 are expected to influence our lives in multiple ways in the years to come. We will have to live with the consequences of the COVID-19 pandemic. Thus, a priority for future research will be to investigate the long-term impact of COVID-19 and containment measures on the population. Population-based longitudinal studies offer an excellent platform to study this impact and have a lot to offer to that end.

**ii) Conceptualising the impact of the COVID-19 pandemic**

The population impact of COVID-19 is greater than the morbidity and mortality experienced by COVID-19 patients and the COVID-19-associated burden to the health system. A population-based COVID-19 study should ideally be able to provide unbiased information on the trajectories of patients who have survived COVID-19, but also on the multidimensional impact of COVID-19 and containment measures on the entire population. Longitudinal information on as many of the following life domains as possible is necessary to generate a fuller picture of this impact and identify intervention targets: family and social life; social relationships; time use and resource availability; health behaviours; physical and mental health and wellbeing; disability and survival; unemployment, socioeconomic position and poverty; labour force participation; housing; health services and social care use and quality of care received; and a series of psychosocial domains including loneliness, social exclusion and discrimination. This list is not exhaustive but gives an idea of the life domains that the COVID-19 pandemic has affected and the challenges policymakers, non-governmental organisations, and the research community must face. In the UK, several population-based longitudinal studies have collected data on many of these domains on multiple occasions including during the pandemic and can successfully be used to study the multidimensional impact of COVID-19.

### iii) **Socioeconomic inequalities and COVID-19**

Contrary to the first impression, COVID-19 is not a leveller that affects all people equally.<sup>1-4</sup> There are socioeconomic inequalities in COVID-19 risk, infection patterns and severity.<sup>1-5</sup> COVID-19-related mortality is unequally distributed with disadvantaged people having a greater risk of severe COVID-19 and death.<sup>1,3,4</sup>

It is now clear that the association between socioeconomic inequalities and the COVID-19 pandemic is complex and goes well beyond the direct link between social disadvantage and increased COVID-19 risk and poorer COVID-19 prognosis.<sup>2,3</sup> The COVID-19 Marmot review provides an excellent overview of this complex association.<sup>3</sup> One of its main findings is that COVID-19 and containment measures made more visible and worsened existing socioeconomic inequalities in health. Population-based longitudinal studies offer the appropriate framework to build upon these initial findings and substantially add to our understanding of the complex interaction between socioeconomic position and other social determinants of health, COVID-19, and the COVID-19 containment measures over time. Questions around the long-term effect of the COVID-19 pandemic on socioeconomic inequalities in health and the social distribution of health in the post-pandemic era can only be answered using longitudinal data from population-based studies.

### iv) **Ageing and COVID-19**

Older people are more vulnerable to COVID-19.<sup>6-8</sup> Biologically, this vulnerability can be attributed to degenerative ageing processes and their manifestations in the form of multimorbidity and immune system dysfunction.<sup>9</sup> In the absence of a better strategy, a focus on disease prevention in combination with vaccination programmes appears to be an effective way to protect older people and reduce the impact of COVID-19. A focus on mental health should also be an integral part of the fight against the COVID-19 pandemic and an ageing-related priority in the post-pandemic era.

Beyond the increased risk of severe COVID-19 and death, there is need to know more about the ways the pandemic has affected older people. This includes examining the effect of COVID-19 and containment measures on older people's life, mental health, and well-being as well as on the way people age, their experiences with ageing, expectations and ageing identity and perceptions. The COVID-19 pandemic has also affected the way the world perceives ageing and older people.<sup>10,11</sup>

To get a fuller picture of COVID-19 as a determinant of the ageing process, its effect on age- and ageing-related domains such as disability, frailty, multimorbidity, end of life, independent living, retirement, well-being, health behaviours, loneliness, and social exclusion needs to be examined. Longitudinal studies like ELSA, the Health and Retirement Study (HRS), and the Survey of Health, Ageing and Retirement in Europe (SHARE) can uniquely contribute to the study of COVID-19 as a disease of the ageing population and unpack the multidimensional effect of COVID-19 on population ageing.

In conclusion, COVID-19 is a new disease, and we need to know more about it and its consequences. Within this context, a consortium of UK population-based longitudinal studies was recently funded to study long COVID-19 (<https://bit.ly/3em683q>). We also need to better understand the multidimensional impact of the COVID-19 containment measures such as social distancing and lockdowns and the COVID-19 period effect on people's lives.

Population-based surveillance studies serve the purpose of generating data on COVID-19 frequency and describing the evolution of the pandemic and its immediate health impact. They cannot be informative of the impact of COVID-19 and containment measures on socioeconomic inequalities on health; ageing; well-being; disability; social relationships and social exclusion. Further, they can only generate a partial account of the impact of COVID-19 and containment measures on physical and mental health and survival. To fully understand these complex associations and be able to design preventive strategies and effectively intervene, high-quality longitudinal data that describe the life and health trajectories of people over time, from the pre-COVID-19 to the post-COVID-19 era, are needed. In the UK, there are several high-quality population-based longitudinal studies that offer such data, and they should be an integral part of the national COVID-19 research infrastructure.

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