Response to: 'Small numbers, big impact: making a utilitarian case for the contribution of inclusion health to population health in England' by Zhang *et al*

Building on a recent meta-analysis of mortality in high-income countries,[1] Zhang *et al* calculated population attributable fractions to estimate that people who have experienced incarceration, homelessness, or a substance use disorder in England accounted for 12% of premature deaths, despite comprising less than 1% of the population.[2] Their findings provide persuasive evidence that investment in the health of these socially excluded groups can yield substantial benefits for population health.

We agree with Zhang *et al* that multisectoral 'top-down' policy change and 'bottom-up' individually tailored interventions are required to address social exclusion. However, the potential impact of such interventions remains to be established.[3] The population attributable fraction calculated by Zhang *et al* represents an upper limit of the potential mortality reduction under the assumption that social exclusion has a direct causal effect on mortality. However, increasing evidence suggests that poor health is normative both before and following experiences of social exclusion, suggesting that social exclusion may be at least partially a *consequence* of poor health. To the extent that this is the case, efforts to prevent social exclusion may be neither necessary nor sufficient to achieve better health outcomes, including reduced mortality. Consequently, the potential benefits of interventions to improve the health of those experiencing social exclusion are limited by reverse causation and factors confounding associations between health and social exclusion.

For example, it is often asserted that incarceration, a widely recognised marker of social exclusion,[1] 'causes' poor health. However, incarceration is usually a marker of pre-existing health risk, at least in high-income countries.[4] As such, efforts to reduce incarceration may not necessarily decrease premature mortality or improve the health of people at risk of imprisonment. As Zhang *et al* acknowledge, upstream and multisectoral efforts that address personality disorder, neurodisability and other pathologies that increase the risk of incarceration and premature mortality are required to improve health across the population.

Zhang *et al* have enriched the evidence base by quantifying the over-representation of socially excluded populations in a key population marker of poor health. As the authors acknowledge, conceptual challenge of defining the counterfactual implied by population attributable fractions mean that these estimates should be interpreted with caution. More detailed data and analyses that consider both the health-related causes and consequences of social exclusion are required for more precise evidence on the potential efficacy of interventions aimed at mitigating social exclusion exposures and the most effective interventions to achieve this.[5]

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