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Commentary: Addressing unfair and preventable inequalities in cancer

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It is generally considered unfair to let differences in health persist when they are preventable and unnecessary.¹ The higher burden of disease in populations with a lower socioeconomic position (SEP) therefore calls for research into the explanations for health inequities. Nejatnamini *et al.*² examined to what extent socio-economic inequalities in cancer morbidity and mortality are attributable to preventable risk factors. Using a prospective observational cohort design, the authors find that downstream modifiable risk factors—i.e. smoking, excess alcohol consumption, low fruit and vegetable intake, physical inactivity and

obesity—together explain 45.6% of the socio-economic inequalities in overall cancer morbidity and mortality. Sex differences were found; smoking was the most important mediator in the total population and for males, whereas for females obesity was the most important mediator.

Data on socio-economic indicators and mediating variables were obtained from a large and nationally representative series of cross-sectional surveys. Longitudinal hospital and mortality registries were used to construct an overall cancer morbidity and mortality outcome measure. That less than half of the inequalities in cancer are explained by

modifiable risk factors is consistent with prior studies that examined socio-economic inequalities in cancer morbidity and mortality separately. Yet, it is likely that the relative contribution of each separate lifestyle factor depends on the outcome under study. For example, the relative contribution of smoking for SEP differences in mortality compared with morbidity may be diminished due to SEP differences in the use of screening and healthcare services.³ The relative contribution of lifestyle factors may also differ between types of cancer. For example, smoking is the most important contributor to lung cancer, whereas red and processed meat consumption is an important risk factor for colon cancer, alcohol consumption for breast cancer and sun exposure for skin cancer.⁴ As the cancer types included in the outcome variable in the study of Nejatnamini *et al.*² are likely to be dominated by lung, breast, colorectal and prostate cancer—the most commonly diagnosed types of cancer in Canada⁵—it is unsurprising that smoking is the most important modifiable risk factor. It also needs to be noted that contrary to many other types of cancer, higher-SEP individuals have higher breast-cancer rates compared with low-SEP individuals.⁴ Due to the socio-economic gradients and prevalence of specific cancer types in this study, and the relative importance of individual risk factors for specific cancer types, combining different cancer types may have attenuated the mediating role of some and strengthened the role of other risk factors. Also, the relative contribution of each lifestyle factor may be dynamic and should be seen in light of potential cohort effects. For example, historically, smoking behaviours were typically adopted by men first and there are significant time lags between smoking initiation and lung-cancer mortality. In 2013, Thun *et al.* showed that smoking-related morbidity and mortality risks were increasing among women while reaching a plateau among men.⁶ Given the increasing burden of disease attributable to high body mass index,⁷ substantial effects of the current obesity epidemic on disparities in cancer morbidity and mortality may be yet to come for both women and men.

Based on the premise that socio-economic inequalities in cancer are to a large extent preventable and thus unfair, interventions should address current and future modifiable risk factors. The authors rightly emphasize that the extent to which the risk factors under study are modifiable by individuals themselves is limited. As such, they argue that interventions and policies should instead target the midstream or, even better, the upstream determinants that lead to the inequalities in these risk factors.² Interventions and policies addressing midstream determinants target the behavioural causes of inequalities, e.g. healthy food subsidies or extra sports facilities, whereas those addressing upstream determinants target the social causes of health

inequalities, e.g. universal basic income or universal access to high-quality childcare. Yet, we would like to debate the suggestion that midstream interventions may only help to alleviate inequities in cancer risk in the short term and upstream structural interventions should therefore be prioritized.² First, apart from the political challenges of eliminating social inequalities, it is unlikely that variations in education and occupation will cease to exist. Second, obesity or smoking as behavioural risk factors and SEP as a social risk factor share some, but not all, upstream drivers.⁸ Even if education, income and power would be equally distributed among those with higher and lower SEP, the unequal distribution of digital, economic and physical environmental cues triggering alcohol consumption, smoking, overeating and physical inactivity would remain in place. As such, we would like to argue that without midstream interventions targeting the behavioural causes of diseases, upstream structural interventions will be insufficient on their own to address the modifiable risk factors needed to reduce socio-economic inequalities in cancer and that a comprehensive portfolio of complementary midstream and upstream strategies is required.

This also demands a shift away from evaluating single interventions that are supposed to eliminate socio-economic inequalities in obesity and other modifiable risk factors for cancer. Randomized-controlled trials (RCTs) are still deemed the gold standard of study designs, but only capture direct effects of the intervention on the outcome and are unhelpful for identifying wider systemic shifts. Study designs used to evaluate community-based interventions, such as cluster-randomized trials, quasi-experiments or repeated cross-sectional surveys, better account for changes at the community level, but they sit lower on the ladder of evidence and suffer from the same focus on linear, direct intervention effects. If the evidence base for policy continues to depend on RCTs as the gold standard, it is inevitable that the type of interventions that can be evaluated through these study designs, i.e. single interventions, will be implemented.⁹ Opportunities for evaluating how interventions impact midstream and upstream drivers should be sought in natural experiments and systems science approaches. For example, a realist approach to evaluation provides a framework for understanding how aspects of the interventions in certain circumstances trigger different types of outcomes.¹⁰ Rather than eliminating variations in contexts and individuals through controlled study settings and randomization, this variation should be analysed as part of the reason why a set of complementary interventions are or are not successfully altering the systemic drivers of the problem under study. System science approaches may also be used for the identification of a range of factors operating at different levels, e.g. stress, healthcare use and quality

of housing, that may explain socio-economic inequalities in cancer morbidity and mortality. We would like to conclude by challenging funders, researchers and editors to be more attuned to the complexity of modifiable risk factors such as obesity and the study designs best suited to evaluate this complexity.

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Conflict of interest

None declared.

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