Reviewer's report

Title: Socioeconomic differences in cancer survival: The Norwegian Women and Cancer Study

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Reviewer: Michel P Coleman

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Major

The authors acknowledge that part of the variation in survival may be explained by higher rates of cancers with poor prognosis among lower SE groups. This is an underexplored competing explanation of the findings. Considering that significant SE trends in survival were generally only found in the combined analyses of all or all solid tumours, and that the role of smoking in explaining a large part of the SE gradient is the major finding of this paper (smoking being greatly associated with lung cancer, one of the poorest prognosis malignancies), it would be appropriate to report the distribution of each of the different cancers across the income and education strata. A further combined analysis of solid tumours, but excluding cancers of poor prognosis, should also be conducted to assess the role of the poor prognosis cancer distribution in the observed socioeconomic survival gradient. The importance of this paper is its focus on the role of lifestyle factors in socioeconomic disparities in cancer survival, an area where more research is certainly needed. Establishing the robustness of the direct role of smoking in SE survival disparities here, rather than through its association with greater incidence of lung cancer in low SE groups, is therefore important for the credibility of this paper.

Minor

Women with missing information on covariates were excluded from the multivariable analyses of solid tumours. The results of these analyses (tables 2 and 3) do not detail how many women were included in each of the respective multivariable analyses, so it is impossible to tell, for instance, if analyses that controlled for smoking status were based on many fewer observations than the corresponding analyses before smoking was controlled for. If indeed many women were missing smoking data, then it is important to know the magnitude of this missingness, and its distribution across the strata of education and income, as well as other covariates, such as age.

A Cox proportional hazards model was employed in the analysis of this dataset. This approach is appropriate considering the prospective cohort nature of this observational study; however, it is an approach for modelling overall mortality. A preferred alternative in cancer survival analysis is the measure of relative survival, which allows for modelling the excess hazard of mortality from cancer
whilst subtracting the effects of other causes on mortality. The implications of modelling the overall risk of mortality for the results reported here warrant some discussion.

Discretionary

Although the authors explicitly state that the term survival is used analogously to mortality risk (pg 6), the two terms generally refer to complementary proportions. This is confusing. When reporting a ‘negative socioeconomic gradient in survival’ (abstract, pg 2), the intuitive impression is of decreasing survival with increasing SES, which is opposite to the intended meaning.

**Level of interest:** An article of importance in its field

**Quality of written English:** Needs some language corrections before being published

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests