Reviewer’s report

Title: Socioeconomic Patterning of Vaping by Smoking Status Among UK Adults and Youth

Version: 1 Date: 11 Dec 2019

Reviewer: Pete Driezen

Reviewer's report:

In general, I think the authors have addressed the concerns raised by the original reviewer.

Having said that, I have one major concern that requires, at the very least, some clarification. It also possibly may require some additional analysis to ensure variances (and confidence intervals) are correctly estimated. In particular, on page 7, lines 9-12, the authors state that "Multiple imputation was applied to include all respondents with valid weights, and 93.2% of the adults and 72.1% of the youth with valid weights had complete data on all analysis variables. Multiple imputation was conducted with an unconstrained model of all analysis variables (i.e. allowing each variable to predict all others) and all results were averaged across 25 imputed datasets." This statements are unclear. Typically, multiple imputation imputes values for observations that have missing data a specified number of times. Multiple values are imputed so as to recognize the uncertainty about the true value. This additional uncertainty has to be incorporated into the analysis phase, so that variance estimates (standard errors, p-values and confidence intervals) account for this additional uncertainty. In other words, the authors state that results were averaged across 25 imputed data sets. However, in multiple imputation, the analysis (e.g., regression model) is estimated "x" number of times, once for each imputed data set (in this case, it would be 25 times, since 25 imputations were conducted). Parameter estimates (coefficients and standard errors) across all 25 sets of analysis are then pooled for statistical inference. This process allows for the additional uncertainty attributable to imputation to be incorporated into variance estimates, standard errors, and confidence intervals. If the authors did indeed perform multiple imputation, they need to clarify this in the methods section so that readers are assured that reported p-values and confidence intervals reflect this additional uncertainty. If not, then p-values and confidence intervals might be under-estimated (too small) leading to spurious conclusions about statistical significance. If the authors did analyze the data this way, it needs to be reported as such. If not, the authors should be encouraged to run the analysis using correct multiple imputation procedures (e.g., PROC MIANALYZE in SAS or other packages such as Stata).

On a minor note, the authors should report the statistical software used to conduct the analysis.

according to a stochastic process, in this case, 25 imputations were conducted. The analysis phase then estimates parameters based on the imputed data,
Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

No

Does the work include the necessary controls?
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