Reviewer’s report

Title: Reweighting National Survey Data for Small Area Behaviour Estimates: Modelling Alcohol Consumption in Local Authorities in England

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Reviewer: Graham Moon

Reviewer's report:

This is an interesting and well-written paper, largely of UK relevance. It does however tread well-covered ground. Twigg et al (2000, 2002) in Social Science and Medicine developed small area estimates of drinking behaviour. A UK Department of Health review in 2004/5 (Bajekal, Pickering et al) also examined alcohol consumption - and reviewed survey re-weighting. Both produced measures at more local scales than LAs. A key conclusion of both was the difficulty of estimating drinking behaviour due to the limitations of SAE methods and the complexity of the determinants. In the UK, PHE offer several relevant direct estimates relevant to drinking at the county/UA level. The claims to novelty in the present paper are a little overstated.

This said, the reweighting proposed in the paper has novelty and the coverage of a range of consumption measures is interesting (though a straightforward extension of both the proposed method and previous papers). It is great to see that code will be available. Both make the paper useful and worth reporting - but two important issues will require attention:

a) The base data for the small area estimation is drawn from the HSfE. The HSfE is based on a hierarchical sampled and any analysis needs to be multilevel. It is not wholly clear but the paper does not mention using multilevel analysis. It talks of multinomial logistic regression with no mention of ML and no indication in that direction in the results tables. This may be important particularly in SAE where it cannot be assumed (as it seems to be here) that a fixed national association between drinking and age, sex, ethnicity, deprivation and hospitalization applies uniformly everywhere across England. It also has issues for the prediction of measures of uncertainty - confidence intervals - around the estimates - which should also be reported. At the very least, these ML issues need to be investigated, reported and commented upon, ideally reworking the SAEs.
b) Related, the HSfE is designed to be representative at the regional level. Using the HSfE to build estimates and then re-aggregating them to the regional level represents a degree of circular reasoning. We need a more convincing approach to 'validation'. Typically in the SAE literature this involves internal validation - assessing the quality of model using standard diagnostics - and external validation as presented in this paper but needing a alternative source and a range of measures of concordance. The paper really should consider both.

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