USING AGGREGATE-LEVEL DATA TO CALIBRATE ERROR-PRONE VARIABLES, WITH APPLICATION TO MEASURING DIET

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Several studies suggest that measurement error in food frequency questionnaires, food diaries and 24-hour recalls, includes a person-specific component correlated with that of other self-reported dietary assessments. Current best practice is to use of biomarkers to adequately calibrate dietary assessment tools for unbiased estimation of associations between diet and disease. Unfortunately, few biomarkers meet the criteria required for this task. We propose that household itemized till receipts may be used to calibrate dietary assessment because they are not self-recorded and not subject to a person-specific bias. We propose extensions to measurement error models that use household-level intake data to calibrate self-recorded intake within a Bayesian framework and discuss how itemized till receipts could be used in practice, with or without the aid of biomarkers. We illustrate the concepts with both simulated and some limited real data. In simulations we show till receipts perform as well as biomarkers, with the advantage of covering a wider range of nutrients. Till receipts may prove cheaper to collect on larger samples, improving standard errors. We discuss the challenges for both nutritionist and statistician.