

Reviewer's report

Title: Bias Magnification in Ecologic Studies: A Methodological Investigation

Version: 1 **Date:** 8 August 2006

Reviewer: Ulf Strömberg

Reviewer's report:

General

The author addresses bias magnification in ecologic studies. The paper is clearly written. In particular, the author explains clearly the magnification of individual-level bias due to ignoring groups. I think the merit of the paper is the presentation and explanation of the magnification factor and its impact.

Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)

1. I think that the paper should be more focused. I suggest the author to concentrate on the impact of the magnification factor under the confounding-by-group and effect-measure-modification-by-group scenarios. Nondifferential misclassification of binary exposure, which has been discussed several times in the literature, can be withdrawn from Results. It is enough to mention that particular source of bias in Discussion, together with other potential sources of bias not considered in the methodological investigation (systematic exposure assessment errors; confounding within groups or effect modification within groups).
2. I suggest that the author provides a concrete ecologic study example, in order to demonstrate (a) how to accomplish a favorable design by trying to minimize the magnification factor and (b) how to post-study-estimate the magnification factor. An example with air pollution as the environmental exposure would be illustrative.
3. The comments on page 6 concerning nonlinearity of the risk function are somewhat confusing. I realize that, for a continuous or polytomous exposure variable, the underlying (true) risk function can be nonlinear. Consequently, model misspecification bias may arise. On the other hand, for a dichotomous exposure variable on the individual-level, isn't the risk function on the group-level always linear under a bias-free scenario? Please clarify Figure 2 and the statement "The amount of error depends on the curvature of the risk function and the exposure distribution within groups, reaching a maximum when exposure is dichotomous".

Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

Discretionary Revisions (which the author can choose to ignore)

What next?: Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

Level of interest: An article of importance in its field

Quality of written English: Acceptable

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