American Journal of
EPIDEMIOLOGY

Volume 160

Number 3

August 1, 2004

Copyright © 2004 by The Johns Hopkins
Bloomberg School of Public Health

Sponsored by the Society for Epidemiologic Research
Published by Oxford University Press

EDITORIAL

Methodological Contributions to the *American Journal of Epidemiology*

NOT FOR PUBLIC RELEASE

Epidemiology is becoming more sophisticated from a methodological and computational standpoint, which will likely lead to a growing number of submissions to the *American Journal of Epidemiology* (AJE) that focus on quantitative methods. The impact factor (ratio of the number of citations to articles published in the preceding 2 years to the number of articles published in the preceding 2 years) for the AJE was 4.2 in 2002, the highest that has ever been. This is notably higher than those of applied statistical journals such as the *Journal of the American Statistical Association*, *Biometrics*, and *Statistics in Medicine* (impact factors of 1.7, 1.2, and 1.5, respectively). Therefore, publishing a methodological paper in the AJE may more broadly disseminate novel methodological ideas.

In 2002 and most of 2003, statistical and methodological submissions comprised 20 percent of all submissions to the AJE and have increased over time at a rate of about one paper every 4 months. Unfortunately, the 17 percent acceptance rate for publication of methodological papers is considerably lower than the 25 percent acceptance for other types of papers submitted to the AJE. In this editorial, we suggest some guidelines for preparing methodological papers for the AJE. Additional guidance to authors can be found in the recent commentaries by Samet (1), Wilcox (2), and Wacholder (3).

Priority will be given to papers detailing important contributions in the design of studies or analysis of epidemiologic data. Such papers may do the following:

- introduce novel statistical methods or study designs that advance the collection, analysis, and interpretation of epidemiologic data;
- exemplify the application of established or new statistical methods or designs in epidemiology;
- provide critical reviews or tutorials of statistical methods that address common challenges in the analysis of epidemiologic data.

More specifically, priority will be given to methodological topics especially relevant to epidemiologic concerns, such as: 1) confounding and effect modification, 2) measures of the impact of genetic factors on health, alone and in their interaction with the environment, 3) selection and information biases, 4) missing data, and 5) causal inference. Specific examples could include propensity scores, inverse-probability-of-censoring weighting to control selection bias, exposure measurement error correction, competing risks, multiple imputation, and meta-analysis. Additionally, there is interest in 6) appropriately modeling the functional form of exposure or covariates by use of statistical methods for smoothing, 7) the use of hierarchical models for combining heterogeneous data sources, 8) analyses of correlated and longitudinal data, and 9) accounting for the uncertainty in both models and assumptions commonly used by epidemiologists.

The form of these submissions to the AJE is an essential consideration. Beyond the general author guidelines found in the AJE Instructions to Authors (http://www3.oup.co.uk/jnls/list/aje/instauth/auth1.html), in the introductory section authors should provide a well laid-out motivation for the method. This should include a brief historical background including seminal references and the method's context in current epidemiologic research. The Materials and Methods section should include a clear and complete description of the methodological approach and assumptions with enough technical detail to allow the reader to implement the method. All parameters and variables must be clearly defined both formally and intuitively. Novel methods and designs should be compared with competing methods commonly used by epidemiologists. If Monte Carlo simulations are used to explore the method, they must include realistic ranges of values found in typical epidemiologic applications (4). Whenever possible, analytical proofs are preferred over simulation studies. Whereas analytical proofs are often global and definitive or have sharply defined restrictions, it is impossible to determine the range of inference to which the results of a simulation study apply, which is necessarily based on a limited range of parameters. In addition, the manuscript should include one focused and realistic example illustrating the methods under consideration, preferably from an application of considerable epidemiologic interest. The Results section should summarize find-

ings in a concise fashion, with informative graphs where possible as substitutes for large tables. In the Discussion section, the authors should clearly summarize the implications and limitations of the contribution by pointing out the most likely departures of the model assumptions and discussing whether each assumption is empirically verifiable with the data available, if extra data are required, or if the assumption is not empirically verifiable. Proofs should be included in an Appendix or specifically referenced. Contributions will be given priority if they include commonly used software (e.g., SAS statistical software; SAS Institute, Inc., Cary, North Carolina) to implement the method either as an appendix or available as freeware from a listed website.

In summary, we hope that our suggestions will help potential contributors to communicate their ideas more effectively and to improve the efficiency of the editorial process. However, this editorial should not be interpreted as a set of rules with which every methodological submission should comply. The categories of papers described above should not be considered exhaustive. We highly value the creativity in your contributions and look forward to excellent methodological submissions to the AJE.

ACKNOWLEDGMENTS

The authors would like to thank Harriett Telljohan, administrator of the *American Journal of Epidemiology*, for kindly providing us the data presented in this editorial.

REFERENCES

1. Samet JM. Dear author—advice from a retiring editor. Am J Epidemiol 1999;150:433–6.
2. Wilcox AJ. Epidemiology: chapter 2. Epidemiology 2001;12:285–6.
3. Wacholder S. WANTED: readable papers on practical epidemiologic methods. Epidemiology 2002;13:618–19.
4. Maldonado G, Greenland S. Simulation study of confounder-selection strategies. Am J Epidemiol 1993;138:923–36.

Francesca Dominici and Donna Spiegelman
Statistical Editors

Stephen R. Cole
Associate Editor in Residence