



Critical Appraisal of a Case-Control Study on Environmental Health

Advantages of using a case-control study design:

- Efficient when studying rare outcomes or those with a long latency period
- Can study multiple risk factors or exposures
- Useful when it is difficult to follow-up a dynamic population

Title Page and Introduction	
Who sponsored the study and what are the authors' affiliations? <i>Bias in study design and interpretation may be a concern</i>	
Is there a convincing rationale and purpose (hypothesis) for doing the study? Does it address a specific issue?	
Study Methods	
Is an appropriate study design used to answer the author's question <i>example, a case-control design is best suited for rare outcomes.</i>	
Is the case recruitment adequate, with cases defined precisely? <i>It is preferable that the case definition be independently validated</i>	

<p>Were a sufficient number of cases selected to allow adequate study power?</p> <p>Were cases representative of the specific population?</p> <p><i>The number of cases may be justified by power calculations. Hospital-based cases only may not be representative of community cases</i></p>	
<p>How were the controls selected?</p> <p>Were they matched by a specific characteristic(s) or selected randomly?</p> <p>Were controls representative of a specific population?</p> <p><i>Often age group and sex are matching variables.</i></p>	
<p>Were the cases and controls comparable in the distribution of potential confounders?</p> <p>Do the authors account for confounding in their analysis?</p> <p><i>When not matched for, confounders should be adjusted for in the analysis</i></p>	
<p>Was the exposure accurately ascertained and verified?</p> <p>Do the measures of exposure reflect what they are supposed to measure?</p> <p>Were measurement methods similar for both cases and controls?</p> <p><i>Recall of occupational exposures may be verified by work records. There is the potential for interviewer bias (conducting interviews differently for cases and controls)</i></p>	

<p>Did the exposure precede the outcome?</p> <p>Was the typical latency of the outcome taken into account when assessing exposure?</p> <p><i>Adult cancer usually requires a latent period of 5 to 20 years from first exposure depending on the agent and dose.</i></p>	
<p align="center">Results and Discussion</p>	
<p>How strong and precise is the association between exposure and outcome?</p> <p><i>The odds ratio indicates the strength of the association, and the 95% CI indicates precision</i></p>	
<p>Can confounding, systematic biases (such as selection bias) or random error be disregarded as alternative explanations?</p> <p><i>Selection bias may occur since both the exposure and disease/outcome have occurred by the time the subject is recruited into the study.</i></p> <p><i>Cases and controls may be selected differentially on the basis of their exposure status or there may be differences in reporting exposure.</i></p>	
<p>Can the study findings be generalized to other people and situations, such as, to the local population?</p> <p><i>For example, were minority populations included? Do the findings apply to a Canadian setting? Can they be applied to your population of interest?</i></p>	
<p>Do the results suggest a causal association? (e.g. Bradford Hill Criteria)</p> <p>Are there other studies to support this association?</p>	

Acknowledgements

This document was written by Helen Ward, NCCEH. Emily Peterson and Tom Kosatsky, NCCEH, reviewed and edited the draft document.

References

1. Wells G, Shea B, O'Connell D, Peterson J, Welch V, Losos M, et al. The Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomised studies in meta-analyses. Proceedings of the 3rd symposium on systematic reviews: beyond the basics; Jul 3-5; St Catherine's College, Oxford, UK: Centre for Statistics in Medicine; 2000.
2. Public Health Resource Unit (PHRU). Critical Appraisal Skills Program (CASP). Oxford, UK: PHRU, Public Health Services; 2006. Available from: <http://www.sph.nhs.uk/sph-files/casp-appraisal-tools/Qualitative%20Appraisal%20Tool.pdf>.
3. Elwood M. Critical appraisal of epidemiological studies and clinical trials. 3rd ed. Oxford, UK: Oxford University Press; 2007.
4. Aschengrau A, Seage III GR. Essentials of epidemiology in public health. Sudbury, MA: Jones & Bartlett Learning; 2003.

Production of this document was made possible through a financial contribution from the Public Health Agency of Canada.