

Confidence interval location

Robert G. Newcombe

Department of Primary Care & Public Health, Cardiff University, UK

Several methods for calculating confidence intervals for a binomial proportion are reviewed, with particular attention to the issue of interval location, viz. whether the resulting intervals tend to be located too close to, or too far out from, the centre of symmetry of the support scale, 0.5. Coverage, location, width and boundary aberration properties are assessed in a very large simulation study. The simplest Wald interval is very deficient in several respects. Several better methods are available. One of the simplest of these, the Wilson score method over-corrects for the inappropriate location of the Wald interval. Tail-based intervals, both exact and mid-P, and Bayes intervals tend to perform best in this respect. Examples of contexts in which one would want to avoid methods which (like the Wald method) suffer from distal shift include disease prevalence, and sensitivity and specificity of diagnostic or screening tests. Conversely, for the low survival rates following use of automatic external defibrillators in the community, mesial shift such as that produced by the score method should be avoided. In such situations, deliberately unequal tail probabilities might even be appropriate. I strongly recommend that future studies evaluating coverage properties of confidence interval methods for proportions and related quantities should also assess interval location.