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Nathan Mantel and William Haenszel: Statistical Aspects of the
Analysis of Data From Retrospective Studies of Disease.
Journal of The National Cancer Institute 1959; 22:719-748.

Mantel and Haenszel's "Statistical Aspects of the Analysis of Data from Retrospective Studies of Disease" is justly famous for its introduction of the test and estimator of a common odds ratio named after the authors. But this paper, by far the longest in this collection, discussed much more than formulas: it also reviewed the history and theory of case-control studies as they stood before 1959. Along with Cornfield and Haenszel's "Some aspects of retrospective studies" [1960] and Dorn's "Some problems arising in prospective and retrospective studies of the etiology of disease" [1959], it long served as text material for basic coursework on case-control studies (indeed, these papers were still in service when I began studying epidemiology). In this regard it may be of interest only in contrast to modern theory: for example, Mantel and Haenszel emphasize on page 722 that

"A primary goal is to reach the same conclusion in a retrospective study as would have been obtained from a forward study, if one had been done."

This has (hopefully) been replaced by an objective common to all studies of obtaining *valid* results, in clearer recognition that "forward" studies (even randomized ones) are also subject to bias. Nevertheless, many concerns have not changed, such as those regarding hospital-based studies.

On the purely statistical side, the Mantel-Haenszel odds ratio is a fascinating item. The authors arrived at it solely through very informal considerations and contrasts against possible alternatives, yet after more than two decades of study the estimator was found to be nearly as optimal in performance as far more complicated procedures, and much better than some long-standing competitors (such as the Woolf estimator, discussed in the preceding paper) [Breslow, 1981]. The Mantel-Haenszel test meanwhile was extended by Mantel to ordinal data and failure-time (survival) analysis [Mantel, 1963, and 1966]; in the latter case it is now better known as the log-rank test. The test has also been shown to have optimal large-sample properties [Gart and Tarone, 1983].

References:

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