

MEHTA, C. R., AND WALSH, S. J. (1992), "COMPARISON OF EXACT, MID- p , AND MANTEL-HAENSZEL CONFIDENCE INTERVALS FOR THE COMMON ODDS RATIO ACROSS SEVERAL 2×2 CONTINGENCY TABLES," *THE AMERICAN STATISTICIAN*, 46, 146-150: COMMENTS BY MANTEL AND SATO AND TAKAGI AND REPLY

The allusion in Mehta and Walsh (1992) to a Mantel-Haenszel confidence interval may give the impression, despite warnings therein, that such intervals were provided by us. A more proper expression could be "Mantel-Haenszel-based confidence interval."

Mehta and Walsh describe circumstances under which the M-H-based interval may perform unsatisfactorily. To my mind, those difficulties arise when things are not sufficiently asymptotic. I suggested (Mantel 1987) similar difficulties arising in connection with use of Wald's test for exponential families. When things are not sufficiently asymptotic, the variance suggested by the data could depart markedly from the true variance. For binomial proportions a moderate sample size could be asymptotic for proportions well away from both zero and unity, but very large sample sizes could be required for proportions near those margins.

In Mantel and Haenszel (1959) we proposed our procedure for testing the null hypothesis of unity for the common odds ratio, not for setting limits on that ratio. It was others who put the emphasis on getting, one way or another, the variance of the Mantel-Haenszel estimator and, in turn, intervals on the common odds ratio. Our way of avoiding difficulties would be to make the variance depend on the limiting value or values for the parameter of interest.

In fact, I did eventually turn to the problem of using the Mantel-Haenszel approach for setting limits on the common odds ratio, as detailed in Mantel (1977). Should Mehta and Walsh focus on the procedure therein, they will likely find it to yield results in very good agreement with those yielded by the exact procedure of Mehta, Patel, and Gray (1985). The weaknesses of the so-designated Mantel-Haenszel (i.e., Mantel-Haenszel-based) confidence interval method would be avoided.

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Mehta and Walsh (1992) compare three common odds ratio confidence interval methods: exact, mid- p , and Mantel-Haenszel. For the Mantel-Haenszel interval, they evaluate the log method, which is based on the asymptotic distribution of the log Mantel-Haenszel estimator with the Robins, Breslow, and Greenland (1986) variance estimator. They state that when either the numerator or the denominator of the Mantel-Haenszel estimator becomes zero, "the Mantel-Haenszel procedure cannot furnish any interval at all" (p. 147).

However, it is the limitation of the log-method. In spite of referring to Sato (1990), Mehta and Walsh do not appreciate the Mantel-Haenszel interval based on the estimating function approach. It gives the appropriate one-sided interval in some extreme situations discussed by Mehta and Walsh. In their 1:4 matched case-control ex-

ample, for seven out of eight matched sets the case was exposed and all four controls were unexposed, and for the remaining one matched set both the case and the controls were unexposed. Although the log method fails to provide any lower limit in this example, the Mantel-Haenszel estimating function interval gives the lower one-sided 97.5% limit of 7.3, not much worse than that of 7.5 by the exact and mid- p methods.

Recently, one of the writers of this letter (Takagi 1991) has compared several confidence interval methods for the common odds ratio: the exact and the mid- p , the log of the conditional maximum likelihood estimate with its variance, the log of the Mantel-Haenszel estimate with the Robins et al. variance, and the Mantel-Haenszel estimating function approach. This may complement the results given by Mehta and Walsh (1992).

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