

Using a nonparametric multilevel latent markov to evaluate diagnostics for trachoma

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Abstrak

In disease control or elimination programs, diagnostics are essential for assessing the impact of interventions, refining treatment strategies, and minimizing the waste of scarce resources. Although high-performance tests are desirable, increased accuracy is frequently accompanied by a requirement for more elaborate infrastructure, which is often not feasible in the developing world. These challenges are pertinent to mapping, impact monitoring, and surveillance in trachoma elimination programs. To help inform rational design of diagnostics for trachoma elimination, we outline a nonparametric multilevel latent Markov modeling approach and apply it to 2 longitudinal cohort studies of trachoma-endemic communities in Tanzania (2000-2002) and The Gambia (2001-2002) to provide simultaneous inferences about the true population prevalence of *Chlamydia trachomatis* infection and disease and the sensitivity, specificity, and predictive values of 3 diagnostic tests for *C. trachomatis* infection. Estimates were obtained by using data collected before and after mass azithromycin administration. Such estimates are particularly important for trachoma because of the absence of a true "gold standard" diagnostic test for *C. trachomatis*. Estimated transition probabilities provide useful insights into key epidemiologic questions about the persistence of disease and the clearance of infection as well as the required frequency of surveillance in the post-elimination setting.