Negative Control Methods to De-bias Test-Negative Design Studies of COVID-19 Vaccine Effectiveness

Eric J. Tchetgen Tchetgen, PhD
Luddy Family President’s Distinguished Professor
Professor of Statistics and Data Science

The test-negative design (TND) has become a standard approach to evaluate vaccine effectiveness against the risk of acquiring infectious diseases in real-world settings, such as COVID-19. In a TND study, individuals who experience symptoms and seek care are recruited and tested for the infectious disease which defines cases and controls. Despite TND's potential to reduce unobserved differences in healthcare seeking behavior (HSB) between vaccinated and unvaccinated subjects, it remains subject to potential biases. First, residual confounding bias may remain due to unobserved HSB, occupation as healthcare worker, or previous infection history. Second, because selection into the TND sample is a common consequence of infection and HSB, collider stratification bias may exist when conditioning the analysis on COVID testing, which further induces confounding by latent HSB. In this paper, we present a novel approach to identify and estimate vaccine effectiveness in the target population by carefully leveraging a pair of negative control exposure and outcome variables to account for potential hidden bias in TND studies. We illustrate our proposed method with extensive simulation and an application to study COVID-19 vaccine effectiveness using data from the University of Michigan Health System.

Thursday September 29, 2022, 3:30-4:30 PM Eastern

133 Rosenau Hall

Virtual using link and info below.

Link: https://unc.zoom.us/j/92602267820?pwd=YW1wN1pjddUNVd1A4TTt2OSmVHBjQT09

Meeting ID: 926 0226 7820 Passcode: 533114