

WEB MATERIAL

Misconceptions About the Direction of Bias From Nondifferential Misclassification

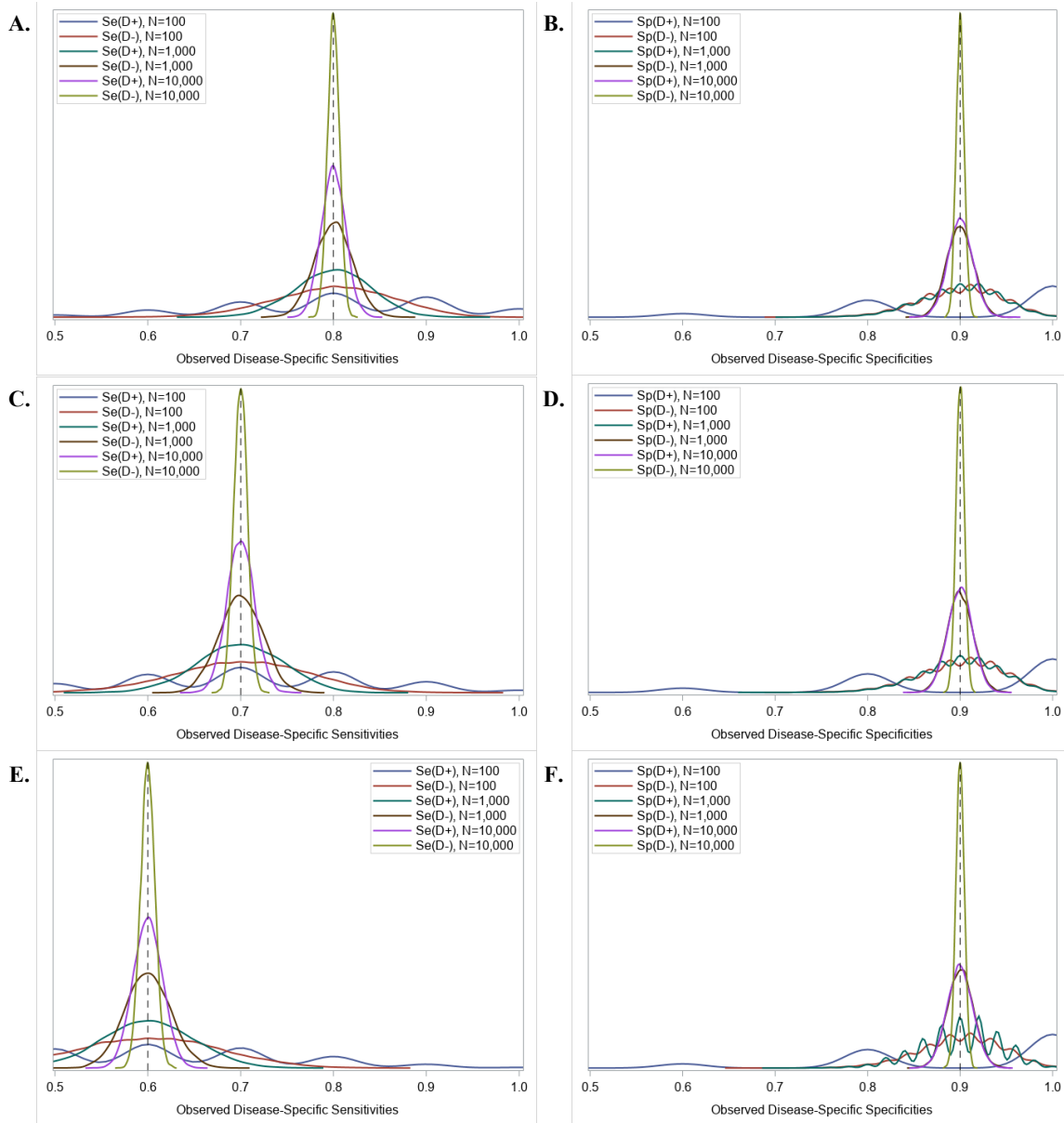
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Web Figure 1. Density plots of the actualized, disease-specific, exposure sensitivity and specificity from 10,000 simulations.

We simulated the classified version of exposure by drawing from binomial distributions with probabilities equal to the specified specificity (90%) and sensitivity (60-80%). Each analysis was repeated at three different sample sizes. Panels A, B: Realized sensitivity (A) and specificity (B) for specified 80% and sensitivity 90% specificity; Panels C, D: Realized sensitivity (C) and specificity (D) for specified 70% and sensitivity 90% specificity; Panels E, F: Realized sensitivity (E) and specificity (F) for specified 60% and sensitivity 90% specificity. **NOTE:** The density distribution for simulations with 100 participants appears bumpy due to the discrete nature of binomial sampling.



Se(D+): exposure sensitivity in the group with the disease; Se(D-): exposure sensitivity in the group without the disease; Sp(D+): exposure specificity in the group with the disease; Sp(D-): exposure specificity in the group without the disease.

Web Table 1. Example of non-differential misclassification across non-adjacent categories of a multilevel exposure variable inducing an inverse dose-response relationship in the presence of a true positive dose-response.

Exposure Status	Outcome Status		Total	Risk	Risk Ratio
	D+	D-			
Correctly classified data					
High	100	2,900	3,000	0.03	5.33
Low	100	5,900	6,000	0.02	2.67
None	30	4,770	4,800	0.01	ref
60% exposure misclassified across non-adjacent categories in both directions (high to none and none to high) ^a					
High	58	4,022	4,080	0.01	0.73
Low	100	5,900	6,000	0.02	0.86
None	72	3,648	3,720	0.02	1.00

^a 60% of people with truly high exposure are misclassified as having no exposure, and 60% of people with truly no exposure are misclassified as having high exposure. In this example, there is a true positive dose response, but misclassification creates a spurious inverse dose response.