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A novel family of chain binomial models to investigate correlated vaccination and infection rates in SVEIRS epidemic dynamics.

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Abstract: A novel platform for investigating disease dynamics in a stochastic process that employs two timescales for the state and the duration of individuals in each disease state is applied to investigate the correlation between vaccination and infection rates in a general SVEIRS disease epidemic. In fact, two questions: (1) "Are more people likely to get vaccinated when actual infection is realized in their midst?" and (2) "Does the availability of vaccines encourage incautiousness, and consequently, a rise in infection rates?" are explored in this study, via modeling and analyzing the asymptotic distributions of the process; and conducting sensitivity analysis in the stochastic model.