

# On the General Epidemic Model with Immigration of Susceptibles and Infections

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We investigate the time to reach a critical number of infections in the Ridler-Rowe (1967) model, a general stochastic epidemic model with immigration of susceptibles and infections. We focus on the study of the distribution of the exact reproduction number  $R_{e0}$  (i. e., the exact number of secondary cases produced by a typical infective individual during its entire infectious period) and the distribution of population transmission number  $R_p$  (i. e., the exact number of secondary cases produced by all infective individuals). Both descriptors were defined by Artalejo and Lopez-Herrero (2013) and are alternative stochastic versions of the well-known basic reproduction number  $R_0$ . We first characterize the distribution of the time to reach a critical number of infections, as well as the probability mass functions and expected values of  $R_{e0}$  and  $R_p$ . Then, we derive an iterative procedure to evaluate these distributions by using percentiles of the maximum number of susceptibles and infections simultaneously present in the population.

## References

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