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Reproduction numbers for epidemic models with households and other social structures I: Definition and calculation of \mathbf{R}_0

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Abstract

The basic reproduction number R_0 is one of the most important quantities in epidemiology. However, for epidemic models with explicit social structure involving small mixing units such as households, its definition is not straightforward and a wealth of other threshold parameters has appeared in the literature. In this paper, we use branching processes to define R_0 , we apply this definition to models with households or other more complex social structures and we provide methods for calculating it.