

# Spatial variation of underreporting in infectious disease surveillance data

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A major obstacle in the spatial analysis of infectious disease surveillance data is the problem of underreporting. Underreporting rates are typically unknown and likely to vary across geographical units. A spatial analysis of the geographical variation of a specific agent will often be difficult due to unknown spatially varying underreporting rates.

This paper investigates the possibility to infer underreporting rates through joint statistical modelling of several infectious diseases. We will adopt the shared component model, proposed by Knorr-Held and Best (2001) for two diseases and further extended in Held *et al.* (2005) for more than two diseases to the infectious disease setting. Our goal is to estimate a shared component, common to all diseases, which may be interpreted as representing the variation in underreporting. Ideally, additional disease-specific components will describe the real spatial variation of the different diseases. Of course, this interpretation is only valid under specific assumptions, in particular the variation in underreporting should be similar for the diseases considered. Also, it is vital that the data do not contain large local outbreaks, so adjustment based on the method proposed in Held *et al.* (2005) are considered.

We will illustrate our approach through an analysis of data from the German infectious disease surveillance network at the Robert Koch Institute in Berlin.

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