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Estimating the prevalence of a rare disease from incomplete lists: A Bayesian approach

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Abstract

We consider the problem of estimating the number of people suffering from a rare skin disease, called ichthyosis. Data consist of three incomplete administrative lists and estimation is based on capture-recapture models. Because a rare disease is of concern, the number of recruited cases is relatively small, and, as a result, the estimate interval may be relatively large. A natural idea to deal with this difficulty is that taking into account some prior information (even poor) on the size of the population of interest (called N) or on capture parameters, when it exists, could improve estimation. For estimating prevalence, we have used graphical models rather than the standard log-linear models. Both allow to model some possible dependencies between lists, but only the former includes capture probabilities and N as parameters, which clearly facilitates the incorporation of the prior. We have analyzed in detail data sets collected in five distinct areas of France. Our bayesian estimation of N is based on an averaging model procedure. We have first performed an informative bayesian analysis in which our prior is based on a recent estimation of the ichthyosis prevalence in Spain. We have then carried out a non informative bayesian analysis, and we have observed that the posterior was sensitive to the choice of the non informative prior placed on N. In particular, the improper uniform prior outputs an estimation of N which is rather far from the others, and we explain why this usual non informative prior is not reasonable in our context.

Biography

Cecile Chouquet is associated Professor in the University Paul Sabatier of Toulouse in the Department of Statistics and Probability. Her research focuses on the modeling of complex biomedical data, often in a Bayesian framework. She works on multi-state models for analyzing longitudinal data, eg on HIV infection, and capture-recapture methods for epidemiological concerns.