

**INDIVIDUAL HETEROGENEITIES AND DIRECTLY TRANSMITTED INFECTIONS:
EFFECTS AND ESTIMATION**

Paddy Farrington and Heather Whitaker

The Open University, Milton Keynes, UK

The estimation of contact patterns between individuals in a population is a central preoccupation of infectious disease modelling of directly transmitted infections. Much work has been done on estimating the effect of fixed covariates such as age, using data from serological surveys, contact surveys and other means. These reveal a strongly assortative age-related contact structure [1,2,3].

However, in contrast to sexually transmitted infections for which relevant individual heterogeneities are perhaps more easily defined and measured, relatively little work has been done on estimating the effects of individual heterogeneity on the transmission of close-contact and airborne infections [4,5].

This paper will review some of the potential sources of individual heterogeneity, discuss their impact on the dynamics of directly transmitted infections, and address issues of identifiability and estimation, particularly from serological and contact data.

1. Kanaan, M. N. and Farrington, C. P. Matrix models for childhood infections: a Bayesian approach with applications to rubella and mumps. *Epidemiology and Infection* 133: 1009-1021 (2005).
2. Del Valle S. Y., Hyman J. M., Hethcote H. W. and Eubank S. B. Mixing patterns between age groups in social networks. *Social Networks* 29, 539-554 (2007).
3. Mossong J., Hens N., Jit M. *et al.* Social contacts and mixing patterns relevant to the spread of infectious diseases. *To appear*.
4. Coutinho F. A. B., Massad E., Lopez L. F. *et al.* Modelling heterogeneities in individual frailties in epidemic models. *Mathematical and Computer Modelling* 30, 97-115 (1999).
5. Farrington C. P., Kanaan M. N. and Gay N. J. Estimation of the basic reproduction number for infectious diseases from age-stratified serological survey data. *Applied Statistics* 50, 251-283 (2001).