Abstract

TUPE0405 - Four cities modelling: #1 rationale, methods and summary of results

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Introduction: The Four Cities Study was conducted to assess whether differences in sexual behaviour and/or biological cofactors affecting the probability of HIV transmission could explain the much more severe HIV epidemics observed in East than in West Africa. Prevalences of circumcision and HSV-2 were lower in West Africa (Yaounde, Cameroon and Cotonou, Benin) than East Africa (Kisumu, Kenya and Ndola, Zambia). Younger age at sexual debut and marriage, and larger age differences between spouses were found in East Africa, but high partner change rates and sex worker contacts were more prevalent in Yaounde, suggesting that higher risk behaviour in West Africa was outweighed by differences in biological cofactors influencing HIV transmission.

Methods: To use mathematical models fitted to data from the Four Cities Study to:
1. Test hypotheses relating variations in the HIV epidemics to (a) differences in biological cofactors, including male circumcision and ulcerative STIs (especially HSV-2), (b) past trends in sexual behaviour, and (c) unmeasured differences in sexual networks.
2. Evaluate the effects of interventions directed at cofactors (male circumcision and HSV-2) and assess how these vary during the HIV epidemics.

Results: Simulations showed that the contrasting HIV epidemics could be explained largely by different prevalences of circumcision, acting, in the early stages of the epidemics, primarily through effects on chancroid. Later in the epidemics, impacts of circumcision interventions were due primarily to direct, rather than STI-mediated, effects. Prophylactic HSV-2 vaccines of high or moderate efficacy could have a substantial effect on HIV incidence. Further details are given in linked abstracts #2-5.

Conclusions: Model simulations support the hypothesis that differences in HIV epidemics in West and East Africa are due largely to differences in biological cofactors. The development of effective HSV-2 vaccines is an urgent priority for HIV control.