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### Seroepidemiology of mumps in Europe (1996–2008): why do outbreaks occur in highly vaccinated populations?

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#### Summary

Mumps outbreaks have recently been recorded in a number of highly vaccinated populations. We related seroprevalence, epidemiological and vaccination data from 18 European countries participating in The European Sero-Epidemiology Network (ESEN) to their risk of mumps outbreaks in order to inform vaccination strategies. Samples from national population serum banks were collected, tested for mumps IgG antibodies and standardized for international comparisons. A comparative analysis between countries was undertaken using age-specific mumps seroprevalence data and information on reported mumps incidence, vaccine strains, vaccination programmes and vaccine coverage 5–12 years after sera collection. Mean geometric mumps antibody titres were lower in mumps outbreak countries [odds ratio

(OR) 0.09, 95% confidence interval (CI) 0.01–0.71)]. MMR1 vaccine coverage  $\geq 95\%$  remained protective in a multivariable model ( $P < 0.001$ ), as did an interval of 4–8 years between doses (OR 0.08, 95% CI 0.01–0.85). Preventing outbreaks and controlling mumps probably requires several elements, including high-coverage vaccination programmes with MMR vaccine with 4–8 years between doses.

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