Contribution of individual risk factors to the international variation in wheeze prevalence in children: a meta-analytic approach

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Background and Aims: We investigate how much international differences in individual risk factors assessed in our study contribute to the high international variation in the prevalence of wheeze using a meta-analytic approach.
Methods: In Phase Two of the International Study of Asthma and Allergies in Childhood, cross-sectional population-based studies of children (8-12yrs) were performed in 30 centres in 22 countries worldwide according to a standardized protocol. Asthma symptoms and a wide range of potential risk factors were assessed by parental questionnaires as well as atopic sensitization by skin prick testing.
For each centre we fitted a logistic regression. Based on the resulting centre-specific beta estimates, we predicted the expected centre prevalence of wheeze at the global average level of exposure to each of the risk factors (equivalent to direct standardization).
Between centre heterogeneity was quantified by a random effects meta-analysis on the predicted prevalences. After running bivariate models, the risk factors that reduced most markedly the heterogeneity were combined in a multivariate model.
Results: The observed prevalence of wheeze ranged from 0.8% to 25.6%.
The most prominent individual risk factors to reduce the variation were parental allergic disease, feather bedding, a smoking mother, damp housing and skin prick test reactivity. When accounting for these factors, the predicted prevalence for the centres ranged from 1.0% to 19.3%. The variance of the combined estimate of the prevalence after adjustment was 64% of the variance for the observed prevalence.
Conclusions: Only a limited proportion of the variation between the centres could be eliminated by adjusting for the investigated individual risk factors. Quantification proves difficult because heterogeneity measures from meta-analysis are susceptible to increases in the standard error after multivariate modeling. In the future we aim to explore multilevel modeling.