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Title: Third-hand tobacco smoke exposure and respiratory complaints in children: A cross-sectional study

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Body: Background Much is known about the respiratory health effects of second-hand smoke (SHS) exposure in children, but not of third-hand smoke (THS) exposure. We evaluated the relationship between SHS and THS exposure and respiratory complaints in children aged 0-13 years living in South-Limburg, the Netherlands. Methods A sample of 10.000 families with a child aged 0-13 years were asked to complete a questionnaire (91 items) for their youngest child, including questions about the age and gender of the child, family characteristics, respiratory health of the child and parental smoking behaviour. Data were analysed with multiple logistic regression. Results 19% (n=1899) responded. Current SHS exposure in children was reported in 20.5% of the children. 5% of the children without current SHS exposure were exposed to THS. Furthermore, SHS exposure was not associated with an increased risk for respiratory complaints in children. THS exposure was associated with respiratory tract infections in the past 12 months (OR_{adjusted}: 2.13; 95%CI: 1.04-4.36; p=0.04) and recent wheezing (OR_{adjusted}: 2.61; 95%CI: 1.19-5.71; p=0.02) in children. Conclusions Unlike previous studies, SHS exposure was not significantly associated with increased risk of respiratory complaints in children, most likely due to the study limitations: cross-sectional design, response rate, selection bias and parental underreporting of their smoking behaviour. Despite these limitations, THS exposure was significantly associated with increased risk for respiratory complaints in children. This adds to the limited knowledge about the health effects of THS exposure in children and suggests that more research on this topic is needed.