



# Prenatal exposure to chemical products, early indoor environment and wheezing and eczema in infancy

Popovic M<sup>1</sup>, Zugna D<sup>1</sup>, Galassi C<sup>1</sup>, Rusconi F<sup>2</sup>, Gagliardi L<sup>3</sup>, Migliore E<sup>1</sup>, Merletti F<sup>1</sup>, Richiardi L<sup>1</sup>

<sup>1</sup> Department of Medical Sciences, University of Turin, AOU Città della Salute e della Scienza and CPO-Piemonte, Turin, Italy

<sup>2</sup> 'Anna Meyer' Children's University Hospital, Florence, Italy

<sup>3</sup> Department of Woman and Child Health, Ospedale Versilia, Viareggio, Italy

## Introduction

Home environment has been linked to childhood allergies and asthma, as have been several household chemical products, but evidence on their health effects in early life is scarce.

## Objectives

We aimed to explore associations of prenatal exposure to chemical substances and indoor environmental exposures in the first months of life with wheezing and eczema in infancy.

## Methods

The study included 4571 singletons from the Italian NINFEA birth cohort. Maternal occupational or non-occupational exposure to chemical products in the third trimester of pregnancy and indoor environment in the first 6 months of life were ascertained from the questionnaire completed by mothers 6 months after delivery. Information on the occurrence of wheezing and eczema between 6 and 18 months of age was obtained from the questionnaire completed 18 months after delivery. Analyses were adjusted for maternal age, history of asthma and atopy, educational level (low, medium and high), nationality (Italian and Non-Italian), smoking during pregnancy, parity and living area (urban and rural).

## Results

Infant wheezing and eczema prevalence were 17.7% and 16.3%, respectively. The most commonly used chemical products in the third trimester were bleach (40.0%), disinfectants (39.4%), window-cleaning products (35.6%) and hair colouring products (23.5%).

Maternal use of bleach and insecticides/pesticides was associated with wheezing, while use of bleach, paint remover and adhesives/mastics was associated with infant eczema (Table 1). Analyses restricted to frequent use ( $\geq 1$  per week) revealed additional associations between window-cleaning products and eczema, and wall paint and wheezing.

Day-care attendance, urban living area, dampness/mould in the house and cooking with gas in the first 6 months of life were positively associated with infant wheezing. Of these exposures, only urban living area and pet keeping were associated with eczema in infancy (Table 2).

## Conclusions

These results suggest that early indoor environment and several environmental exposures during a critical developmental period are involved in the onset of early wheezing and eczema.

Table 1. Associations between exposure to chemical products during pregnancy and infant wheezing end eczema

Exposures in pregnancy	Prevalence (%)	Wheezing OR <sub>adj</sub> (95% CI)	Eczema OR <sub>adj</sub> (95% CI)
<b>Cleaning products</b>			
Disinfectants	1803 (39.4)	1.08 (0.92-1.26)	1.07 (0.91-1.26)
Bleach	1830 (40.0)	<b>1.17 (1.00-1.37)</b>	<b>1.31 (1.12-1.54)</b>
Window cleaning products	1629 (35.6)	0.97 (0.82-1.14)	1.12 (0.95-1.32)
Carpet stain remover	71 (1.6)	0.98 (0.54-1.80)	1.13 (0.61-2.08)
Oven cleaner	539 (11.8)	1.10 (0.87-1.39)	1.04 (0.81-1.32)
Paint remover	39 (0.9)	1.05 (0.44-2.49)	<b>2.04 (1.03-4.04)</b>
<b>Home maintenance products</b>			
Adhesives and mastics	226 (4.9)	1.14 (0.81-1.60)	<b>1.41 (1.01-1.97)</b>
Wall paint	344 (7.5)	1.23 (0.93-1.62)	1.16 (0.87-1.53)
Herbicide	16 (0.4)	1.00 (0.30-3.37)	1.20 (0.35-4.05)
Pesticides/ insecticides	209 (4.6)	<b>1.46 (1.04-2.04)</b>	0.95 (0.66-1.38)
<b>Hair and body care products</b>			
Aerosols or sprays (hairspray)	606 (13.3)	1.06 (0.85-1.33)	1.04 (0.83-1.30)
Hair colouring products	1075 (23.5)	1.02 (0.85-1.23)	1.14 (0.94-1.37)
Chemicals for permanent wave	21 (0.5)	2.20 (0.99-4.91)	1.28 (0.42-3.88)
Hair removal cream	398 (8.7)	<b>0.73 (0.54-0.98)</b>	1.03 (0.78-1.36)

Table 2. Associations between indoor environment in the first 6 months of life and infant wheezing end eczema

Exposures in the first 6 months of life	Prevalence (%)	Wheezing OR <sub>adj</sub> (95% CI)	Eczema OR <sub>adj</sub> (95% CI)
Urban living area	3281 (78.9)	<b>1.27 (1.02-1.58)</b>	<b>0.73 (0.60-0.89)</b>
Pet keeping	1450 (31.8)	1.09 (0.91-1.31)	<b>0.83 (0.69-1.00)</b>
Dampness and/or mould	519 (12.3)	<b>1.48 (1.17-1.86)</b>	1.01 (0.79-1.30)
Attending daycare	178 (4.3)	<b>2.11 (1.49-2.99)</b>	1.17 (0.78-1.73)
Maternal smoking	302 (6.7)	1.30 (0.96-1.76)	1.20 (0.87-1.65)
Passive smoking <sup>§</sup>	47 (1.6)	1.28 (0.61-2.72)	1.56 (0.76-3.21)
Air conditioning <sup>§</sup>	790 (26.6)	1.15 (0.92-1.44)	0.96 (0.76-1.21)
Cooking with gas <sup>§</sup>	2828 (95.5)	<b>2.31 (1.22-4.39)</b>	0.82 (0.52-1.30)

