

Maternal Smoking during Pregnancy and Asthma in Children and Young Adults

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Background

Asthma is the most common disease in children.¹ Asthma is an inflammatory disease of the airways characterized by variable and recurring symptoms such as wheeze, cough, chest tightness and shortness of breath ranging from intermittent to severe life threatening disease.² Recent decades have witnessed a doubling of the prevalence of asthma.³

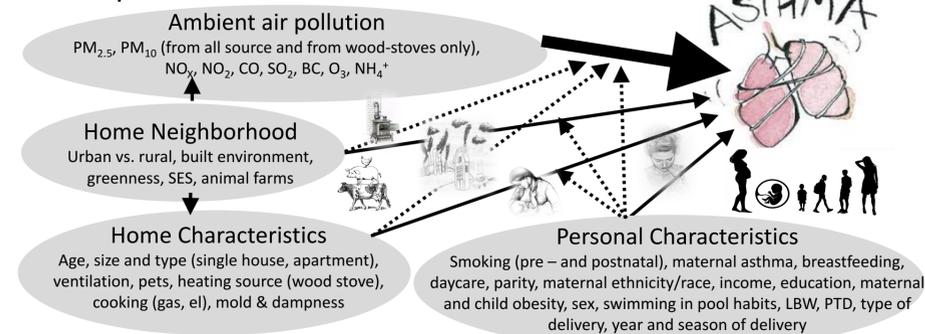


Fig. 1. Simplified illustration of the relationships between ambient air pollution exposure, home neighborhood, home and personal characteristics and asthma development risk.

Dotted lines indicate potential effect modification.

Globally, it is estimated that each year, 4 (1.8, 5.2) million new pediatric cases could be attributable to NO₂ exposure.⁴ The role of ambient air pollution on asthma development is not fully understood, as multiple factors starting from fetal life may be involved.⁴ Some of these factors may be correlated, share sources and pathways resulting in joint effects that are greater than additive. Thus, the potential for confounding and modification of the air pollution exposure effects on asthma by for example maternal smoking is very high (Fig. 1)

Objectives

To prepare for our HEI funded studies on ambient air pollution and asthma (exposure modelling is ongoing), we examined the associations between maternal smoking during pregnancy and asthma incidence.

We examined different definitions of asthma since the severity can range from intermittent to severe disease.

Methods

We obtained data on asthma, smoking and other personal, home and neighborhood characteristics from all children born in Denmark from 1997 to 2016. We used the personal identification (CPR) numbers to link individual-level information from Denmark's population-based registers with extensive data from two prospective birth cohorts (Fig. 2).

Prescription of asthma medicine
Cases defined as children who had redeemed any type of anti-asthmatic drug except for beta2-agonists as liquid, inhaled beta2-agonists only once or inhaled steroid only once (first case only).

Hospitalization due to asthma
Cases defined as children who had at least one hospital registration, with an ICD10 code of either J45 or J46 (first case only)

Parental records of doctor-diagnosed asthma
Cases from positive replies to questionnaires administered at age 1.5, 7 and 11 years. Only for the DNBC children
"Has a doctor ever said that your child had asthma?"

Early transient
i.e. only at age 4-6 years

Persistent
i.e. at 4-6 years and 14-19 years

Adolescent-onset
i.e. only at age 14 or later but not before

Study population:
• Entire Denmark
○ DNBC (N=90,000)
◆ COPSAC (N=1,000)

Fig 2. Asthma definitions and study populations. The three last mentioned distinct phenotypes were defined in order to compare the results with the findings from the MeDALL project.⁵

References ¹WHO 2016, ²Carr and Bleecker, ³Eder et al 2006, ⁴Peat et al 2002, ⁵Thacher et al 2017



Preliminary Results

Results reported here are preliminary as we are in the process of cleaning data and reducing missing values. We include, at this stage, a total of 1,160,063 children (Fig.3), but this number is expected to be slightly smaller as geocoding of the residential addresses failed for 2%.

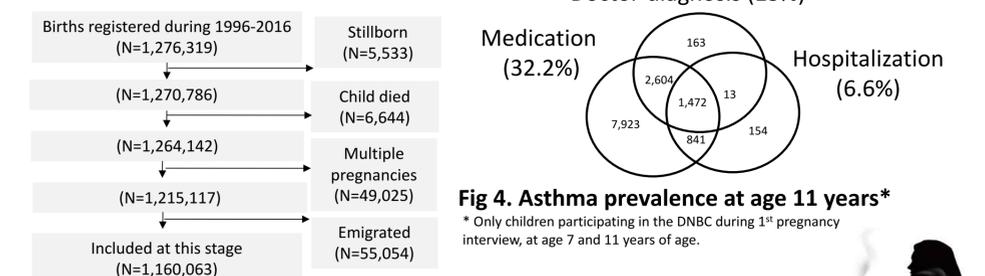


Fig. 3. Study population flowchart.

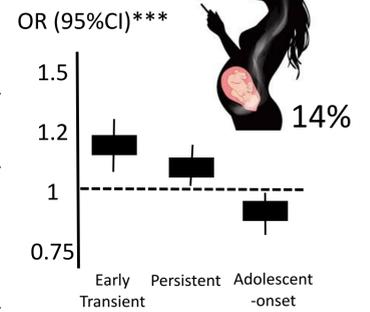
Maternal smoking during pregnancy and asthma.

	Medication (n=327,476)	Hospitalization (n=65,365)
Crude	OR (95%CI)* 1.90 (1.82, 1.92)	OR (95%CI)* 1.87 (1.83, 1.91)
Adjusted**	1.38 (1.35, 1.41)	1.41 (1.40, 1.43)

* Logistic regression with GEE to taking into account siblings
** Adjusted for child's age, maternal education, maternal income, maternal origin, maternal asthma, parity, season of birth and year of birth

These preliminary findings support existing evidence that links maternal smoking during pregnancy with increased risk of asthma development.⁵ We plan to examine the single and joint effects of air pollution and smoking when the data are available.

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*** Restricted to children born 1996-2002