

measurement was annualized over the data collection period. Patient-level reutilization was calculated for 981 hospitalized children who were followed for ≥ 12 months to identify time to first asthma-related ED revisit and/or rehospitalization. Cincinnati Police Department data were used to calculate violent crime rates (VCRs) and all crime rates (ACRs) by dividing the crime per tract by total people residing in the tract. Crime rates were then stratified as low, low medium, high medium, and high. Poverty rate, unemployment, asthma-related housing code violation density, and traffic-related air pollution were identified as covariates of the study.

RESULTS. Both VCRs and ACRs were associated with asthma utilization with the average asthma utilization rate of 28.0 per 1000 patients and the average VCR and ACR of 10.5 per 1000 patients and 118.7 per 1000 patients per year, respectively. There was a trend toward hospitalized children being more likely to reutilize if they lived in an area with a higher VCR and ACR in unadjusted models.

CONCLUSIONS. Crime data may help facilitate early identification of risk factors or stressors relevant to asthma utilization patterns.

REVIEWER COMMENTS. Asthma, as any other chronic illness, is affected by social and environmental factors. Crime rates can be used to assess the stress imposed by the environment on a child's health, particularly in instigating an acute exacerbation, compliance with controller medication, and follow-up with the primary care provider. In this study, a basis is provided for identifying potentially modifiable population-level and patient-level environmental factors which play an important role in the management of asthma, the most common pediatric chronic illness.

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Breastfeeding and Asthma Outcomes at the Age of 6 Years: The Generation R Study

den Dekker HT, Sonnenschein-van der Voort AM, Jaddoe VW, Reiss IK, de Jongste JC, Duijts L. *Pediatr Allergy Immunol.* 2016;27(5):486-492

PURPOSE OF THE STUDY. To investigate the association of duration and exclusiveness of breastfeeding with asthma outcomes in children aged 6 years and determine association with atopy or infection.

STUDY POPULATION. Prospective cohort study of 5675 children from the prenatal period until young adulthood in the Netherlands.

METHODS. Information about breastfeeding was collected through questionnaires. At age 6, airway resistance and

exhaled nitric oxide (FeNO), a marker of eosinophilic airway inflammation, were measured. Follow-up questionnaires inquired about wheezing patterns and current asthma.

RESULTS. Children who were not breastfed had increased risk of late and persistent wheezing (odds ratio [95% confidence interval]: 1.69 [1.06 to 2.69] and 1.44 [1.00 to 2.07], respectively) and lower FeNO levels (estimated percentage difference [95% confidence interval]: -16.0 [-24.5 to -7.5]). Shorter duration of breastfeeding was associated with early wheezing (as was less exclusive breastfeeding) and current asthma at age 6 years. Breastfeeding duration and exclusiveness were not associated with FeNO or airway resistance. The associations were explained partly by lower respiratory tract infections in early life and to a lesser extent by lower respiratory tract infections in later life.

CONCLUSIONS. Breastfeeding patterns may influence wheezing and asthma in childhood, which seems to be partly explained by infectious mechanisms.

REVIEWER COMMENTS. In this study, the researchers add longitudinal data about breastfeeding and asthma outcomes among a cohort in the Netherlands through age 6 years. Interestingly, those who were never breastfed had increased risk of late and persistent wheezing but lower FeNO levels. In addition, the risk of wheezing associated with lack of breastfeeding seemed to be at least partially mediated by respiratory infections. Limitations include the potential for selection bias because the characteristics of the participants who were lost to follow-up were different than those included in the study. Finally, 70% of participants were of European ethnicity, which may affect generalizability of these findings.

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Breastfeeding, Maternal Asthma and Wheezing in the First Year of Life: A Longitudinal Birth Cohort Study

Azad MB, Vehling L, Lu Z, et al. *Eur Respir J.* 2017;49(5):1-9

PURPOSE OF THE STUDY. To examine the association of breastfeeding and wheezing in the first year of life in a pregnancy cohort, with attention to maternal asthma and infant sex.

STUDY POPULATION. The study included 2773 infants born to women enrolled in the Canadian Healthy Infant Longitudinal Development (CHILD) Study, a population-based birth cohort, from 2009 to 2012.

METHODS. Caregivers reported on infant wheezing and infant feeding via questionnaire at 3, 6, and 12 months of life.

Breastfeeding was classified as exclusive, partial, or none. Poisson regression was used to examine the relationship between breastfeeding and wheezing rates, and logistic regression was used to investigate recurrent wheezing. Models were adjusted for maternal asthma, smoking, and education. Effect modification by maternal asthma and infant sex were also examined through stratification.

RESULTS. Twenty-one percent of women in the study had asthma, and 21% of infants wheezed. In mothers with asthma, breastfeeding was inversely associated with infant wheezing. Compared with no breastfeeding at 6 months, wheezing was reduced by 62% with exclusive breastfeeding. Wheezing was reduced by 37% with partial breastfeeding supplemented with foods. Breastfeeding was not significantly protective when supplemented with formula. There was a significant protective, dose-dependent association between breastfeeding and wheezing; the rate of wheezing was 0.63 episodes per person year among those breastfed <6 months, 0.5 in those breastfed for 6 to 12 months, and 0.31 in those who breastfed for 12 months or more. These findings were not significant in the absence of maternal asthma.

CONCLUSIONS. In infants born to mothers with asthma, breastfeeding was shown to be protective against wheezing in a dose-dependent manner. This association was somewhat stronger in male infants and independent of other established risk factors for infant wheezing. This association was weakened by supplementation with formula before 6 months of age.

REVIEWER COMMENTS. The authors of this study add to the evidence that breastfeeding confers protection against wheezing in infants. The authors improved on limitations of previous studies by using a longitudinal study design with prenatal recruitment. In addition, in this study, the authors differentiated between exclusive and partial breastfeeding. The study was limited by parent-reported wheezing and only 1 year of follow-up in infants studied. Follow-up is underway in the Canadian Healthy Infant Longitudinal Development cohort and will glean important outcomes as we further our understanding of potential long-term benefits on reducing the prevalence of asthma.

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Environmental and Mucosal Microbiota and Their Role in Childhood Asthma

Birzle L, Depner M, Ege M, et al. *Allergy*. 2017;72(1):109-119

PURPOSE OF THE STUDY. To analyze the relationship between farming, asthma status, and the diversity and composition

of bacterial microbiota of mattress dust and nasal swab samples in children.

STUDY POPULATION. The study included 86 school-aged children from the Austrian arm of the Genetic and Environmental Causes of Asthma in the European Community-Advanced Studies (GABRIELA) cross-sectional multidisciplinary study.

METHODS. Mattress dust and nasal samples were collected between May and July 2007. DNA from the samples were analyzed and then clustered together in operational taxonomic units (OTUs), which are defined as clusters of the respective 16S ribosomal RNA sequences with at least 97% sequence similarity. Based on the number of OTUs, bacterial diversity and composition were determined and related to farm exposure and asthma status.

RESULTS. Bacterial diversity in mattress dust was significantly greater in farm children and in those with exposure to cow and straw compared with nonfarm children. In nasal samples, an association with bacterial diversity was seen only with exposure to both cow and straw compared with those with no exposure to either. In mattress dust, *Clostridium*, *Facklamia*, an unclassified genus within the family of *Ruminococcaceae*, and 6 OTUs were significantly associated with farming. Asthma was inversely related with richness and diversity in mattress dust (adjusted odds ratio [aOR] = 0.48 [0.22-1.02]; aOR = 0.41 [0.21-0.83], respectively), and to a lesser extent in nasal samples (aOR = 0.63 [0.38-1.06]; aOR = 0.66 [0.39-1.12], respectively), even after controlling for medication and atopy status.

CONCLUSIONS. In this study, it was found that mattress dust and nasal samples in farm children had greater bacterial diversity than in non-farm children. The stronger inverse association of asthma with bacterial diversity in mattress dust as compared with nasal samples suggests microbial involvement beyond mere colonization of the upper airways.

REVIEWER COMMENTS. Researchers in numerous previous studies, many of whom are from these same authors, have convincingly shown reduced rates of allergic disease in children growing up on farms. This has been presumed to be related to effects on the microbiome, and this study takes another step forward in demonstrating these relationships. The addition of nasal sampling is especially interesting, with results opposite of those that had been hypothesized because they suggest that colonization of the airways is not the predominant mechanism for asthma protection in farm children.

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**Breastfeeding, Maternal Asthma and Wheezing in the First Year of Life: A
Longitudinal Birth Cohort Study**

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