SHINE a health integration team

Bristol Health Partners

No. 17 Rural and urban school children exposure to air pollution

Top Line: Children exposed for years to an urban environment are at increased risk of reduced lung function and slower lung growth as a result of road traffic pollutants.

Emissions from motor traffic contribute significantly to the concentrations of local pollutants worldwide. Populations who live, work, or attend school near high traffic areas are considered as high-risk groups regardless of their urban or rural residential area. However, children raised in rural environments show a lower risk of asthma and aeroallergen sensitization that has been attributed to a "protective" farming effect due to close contact with large animals in combination to genetic predisposition. Conversely, children exposed for years to an urban environment are at increased risk of reduced lung function and slower lung growth. It is possible that the polluted urban environment *per se* facilitates subclinical small airway disease e.g. asthma.[1]

It is one of the largest multi-centre studies on asthma and rhinitis[2] among pre-school children in China (age 3- 5), the researchers reported that urbanisation can be linked to less wheeze but more rhinitis and diagnosed asthma and that traffic related air pollution (TRAP) can be a risks factor for asthma and rhinitis. Breastfeeding, large family size and early-life farm exposure could, in contrast, be protective factors.[3]

In the detail, the researchers found that outdoor concentrations of nitrogen dioxide (NO_2) on city level, and living near major roads, were associated with asthma, rhinitis and current respiratory symptoms. Moreover, living in suburban or rural areas was associated with less asthma, rhinitis and night dry cough. Since the main source of NO_2 is from traffic emission and the exposure to TRAP is less in suburban or rural areas, and thus the overall conclusion from our study is that TRAP could be an important risk factor for asthma, rhinitis and respiratory symptoms among pre-school children in China. These findings are in agreement with previous studies mainly from western countries. In addition, an earlier study comparing urban and rural Iran also found that the association between higher pollutant concentrations and reduced pulmonary function in an urban-rural comparison suggests that there is an effect of urban air pollution on short-term lung function and/or lung growth and development during the preadolescent years.[4]

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[1] Priftis, K. et al, 2009. Asthma Symptoms and Airway Narrowing in Children Growing up in an Urban versus Rural Environment, *Journal of Asthma*, 46(3) 244-2511.

[2] Allergic rhinitis is inflammation of the inside of the nose caused by an allergen, such as pollen, dust, mould or flakes of skin from certain animals. It's a very common condition, estimated to affect around 1 in every 5 people in the UK. https://www.nhs.uk/conditions/allergic-rhinitis/

[3] Norbäck, D. et al, 2018. Asthma and rhinitis among Chinese children — Indoor and outdoor air pollution and indicators of socioeconomic status (SES), *Environment International*, 15: 1-8.

[4] Asgari, M. et al, 1998. Association of Ambient Air Quality with Children's Lung Function in Urban and Rural Iran, *Archives of Environmental Health*, 55(3): 222-230.