

# PULMONARY EFFECTS AMONG CHILDREN EXPOSED TO ARSENIC IN UTERO IN MATLAB, BANGLADESH

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**Background and Aims:** The lung is a surprising target site for health effects of exposure to arsenic in drinking water (Smith et al. 2006; von Ehrenstein et al. 2005). Though we know such exposure causes lung cancer and respiratory effects in adults, we have yet to establish lung health effects after early life exposure. Exposure to arsenic is widespread in Bangladesh, but little is known about the effects on children (Smith et al. 2000). We will investigate lung health endpoints among children aged 7 to 16, after exposure in utero and in early childhood.

**Methods:** This population-based cohort study assessed the lung function and respiratory symptoms, including chronic cough and shortness of breath, of children 7 to 16 years old after arsenic exposure in utero and in the first five years of life. In utero exposure was assessed based on drinking water arsenic concentrations consumed by the mother during pregnancy. Here we compare children with in utero exposure to more than 500 ug/L of arsenic to children exposed to less than 10ug/L in utero.

**Results:** The most notable findings to date are that exposed children have considerably higher prevalence of several chronic respiratory symptoms compared to unexposed children. For example, children who had experienced in utero exposure to more than 500ug/L of arsenic were more likely to report shortness of breath when walking fast or climbing (OR=3.19, 95% CI 1.22-8.32,  $p<0.01$ ), and nearly four times more likely to report shortness of breath when walking on level ground (OR=3.86 CI 1.09-13.7,  $p=0.02$ ). However, there was little evidence of effects on lung function.

**Conclusions:** This is the first comprehensive study of early life exposure to arsenic in drinking water on lung health effects in children. Increased respiratory symptoms were identified, but so far we have found little measurable effect on lung function.

## References:

- Smith AH, Lingas EO, Rahman M. 2000. Contamination of drinking-water by arsenic in Bangladesh: a public health emergency. *Bull World Health Organ* 78(9): 1093-1103.
- Smith AH, Marshall G, Yuan Y, Ferreccio C, Liaw J, von Ehrenstein O, et al. 2006. Increased mortality from lung cancer and bronchiectasis in young adults after exposure to arsenic in utero and in early childhood. *Environ Health Perspect* 114(8): 1293-1296.
- von Ehrenstein OS, Mazumder DN, Yuan Y, Samanta S, Balmes J, Sil A, et al. 2005. Decrements in lung function related to arsenic in drinking water in West Bengal, India. *Am J Epidemiol* 162(6): 533-541.