

Science for Environment Policy

Exposure to fine particle air pollution during pregnancy may increase child's risk of developing Autism Spectrum Disorder

The chances of a child developing Autism Spectrum Disorder (ASD) are higher if the mother is exposed to high levels of fine particulate air pollution during pregnancy, a recent study suggests. This increased risk was associated specifically with exposure in the last three months of pregnancy, the researchers found.

ASD is a significant health issue worldwide and encompasses a range of developmental conditions that affect social interactions and communication. The group of disorders includes Asperger's Syndrome, childhood autism, and similar disorders classified as on the 'autism spectrum'. Although researchers have found that genes play an important part, recent studies suggest that a mother's air pollution exposure during pregnancy may also affect the risk of her child developing the condition. This is because such exposure might interfere with the unborn child's brain development.

This study investigated whether pregnant women's exposure to particulate matter (PM) [air pollution](#) affected the risk of the children developing ASD. The researchers used data from the US Nurses' Health Study II, a large and ongoing study that has been tracking the health of over 100 000 female nurses across the US, since 1989. The nurses completed a questionnaire in 2005 and the researchers asked them whether any of their children born 1990 to 2002 had developed ASD. This was then followed up with a study initiated in 2007.

In all, the study included 245 children identified as having ASD and 1522 randomly selected children without ASD. Using data from the US Environmental Protection Agency's Air Quality System, and other sources, the researchers estimated the monthly exposure of mothers to airborne PM_{2.5} — particles 2.5 micrometres (µm) or less in diameter, and PM₁₀ — particles 10 µm or less in diameter, at their home addresses. The models used included information related to potential air pollution sources, including distance to roads for traffic pollution and power stations, population density, as well as weather conditions.

For each child, exposures were estimated before, during and after pregnancy by averaging monthly concentrations for the mother's residential address during pregnancy. The results revealed that there was a significant association between a mother being exposed to fine airborne particles PM_{2.5} during pregnancy, and their child having ASD. The researchers found little association between exposure to PM_{2.5} before or after pregnancy, or to larger particles (PM_{10-2.5}) and ASD. The increased risk of a child developing ASD was associated specifically with exposure to PM_{2.5} in the last three months of pregnancy, rather than with the first six months.

The researchers say it is unclear exactly how a mother's exposure to airborne particulates increases the risk of her child developing ASD, but other studies suggest that a mother's response to environmental pollution can be passed to her unborn baby, affecting, for example, the development of its brain. However, further work is needed to identify the exact mechanism responsible for this increased risk and why there is an association specifically with ASD.



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