

Mother's exposure to air pollution associated with low-birth-weight babies

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Since babies with low birth weight often have poor health outcomes, there is considerable interest in identifying the factors that affect birth weight. Air pollution has been identified as one possible factor, however

several studies have produced conflicting results and there is scarce data from the Middle East region. A recent study, initiated by Professor Hagai Levine of the Hebrew University (HU)-Hadassah Braun School of Public Health, showed unequivocally that air pollution is associated with low-birth-weight babies. Using personal, anonymized data and detailed high-resolution pollutant data enabled the Hebrew U. team to produce more accurate statistical analyses. Indeed, Levine maintains, "it is now clear that governments need to set up the infrastructure to integrate environmental and health data at the personal level."

This study, led by Wiessam Abu Ahmad, a doctoral student of Levine and Prof. Ronit Nirel at HU's Department of Statistics and Data Science, looked at the link between an air [pollutant](#) known as PM_{2.5} and the birth weight of 380,000 singleton [babies](#) born to mothers all over in Israel during the years 2004–2015. Their findings were published this week in the journal *Environmental Research*.

Israel, a country with the highest fertility rate among OECD countries and high levels of the air pollutant PM_{2.5}, made it an ideal location to look for an association between low birth weight and poor air quality. Abu Ahmad explained that as the model included siblings, it enabled the estimation of the variance in low birth weight to be accounted for by variances between different mothers, leading to more accurate estimates. The data used by the research team included: personal anonymized data on the mothers, including the area where they lived and the weight of their babies at birth (provided by Maccabi Health Services); and daily air pollutant concentration over each square kilometer of Israel, derived from satellite data (provided by Ben Gurion University).

The study clearly showed the association between the level of the air pollutant PM_{2.5} and low [birth weight](#). It also revealed that mothers who were underweight and those of lower socioeconomic status were more vulnerable to exposure to [air pollution](#). Further, the study found that the

association with air pollution was stronger among female babies and first births—a fact that is thought to be due to a biological mechanism that has yet to be identified.

The association of air pollutants with low [birth weight](#) raises the question of whether the Israeli government should take the impact on the developing baby into account and increase its efforts to reduce pollution. That said, much of the pollution in Israel is carried in by the wind from other countries.

The findings are, however, an important contribution in identifying a contributory cause to [low birth weight](#). Most importantly, this study breaks new ground in establishing the value of collecting personal detail relating to individuals rather than taking averages over aggregated data.

More information: Wiessam Abu Ahmad et al, Mother-level random effect in the association between PM2.5 and fetal growth: A population-based pregnancy cohort, *Environmental Research* (2022). [DOI: 10.1016/j.envres.2022.112974](#)

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