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Contact:
rappazzo.kristen@epa.gov

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Poor air quality associated with increased risk of preterm birth

Research using the Environmental Quality Index (EQI) linked increased risk of preterm birth with poor air quality, but not with overall low environmental quality. The study is one of the first to explore the relationship between preterm birth and environmental quality across a range of different environmental domains (including water, air, land, built environment and sociodemographic aspects).

Previous research has linked poor air quality, particularly particulate matter, ozone and nitrogen dioxide, with an increased risk of preterm birth, but few studies have explored the cumulative effects of exposure across a range of environmental domains or across a range of population densities (e.g. urban to rural communities).

This study explored the relationship between environmental quality across five domains (air, water, land, built and sociodemographic) and the risk of preterm birth. It also explored the effect of a single environmental quality (EQI) domain, which combined these five categories, on the risk of preterm birth over the period 2000 to 2005. The study also considered the impact of urbanisation, categorising 3131 counties in the USA as metropolitan urban, non-metropolitan urban, less urban and rural/isolated communities.

Ethnicity, marital status, educational attainment and age are also factors known to influence the risk of preterm birth. For the county-level analysis, the authors took into consideration racial mix, while individual risk analyses were adjusted for age, educational attainment and marital status. Preterm birth was defined as a birth occurring between 20 and 36 weeks of completed gestation (inclusive).

The researchers found poor air quality (measured using data on 93 air pollutants, obtained from the US Environmental Protect Agency) was associated with an increase in preterm birth across the four urban—rural classifications at the county level, but found no evidence of a link between preterm birth and the water, built and land domains. The impact of sociodemographic factors on preterm birth varied across the urban—rural classifications, with a link between sociodemographic deprivation and preterm birth evident in urban metropolitan areas only. In contrast, increasing sociodemographic disadvantage was associated with a lower risk of preterm birth in non-metropolitan urban, less urban and rural/isolated areas.

Similar patterns were seen when the data were analysed to produce individual level odds ratios (which use individual level data rather than data aggregated to the county-level), which included more than 22 million women. The researchers found the risk of preterm birth increased as air quality worsened across all four urban–rural classifications. Sociodemographic disadvantage again was only associated with an increased risk of preterm birth in metropolitan urban areas.

The combined measure, the EQI, was designed to measure overall environmental quality. For both the county level and individual odds ratios, the EQI indicates that worsening environmental quality is associated with a decreased risk of preterm birth, even accounting for the fact that air quality was associated with an increased risk of preterm birth. This highlights the importance of considering different environmental domains and potential causal mechanisms when identifying health risks.

The authors note that, because data is less readily available for sub-urban and rural areas, they are more reliant on estimation than urban areas. In addition, the authors say that county-level data may be more representative of exposure in rural areas than in urban areas. This is because county-level data fails to account for individual differences in exposure in urban areas.