

Title: Maternal health outcomes associated with ambient air pollution: An umbrella review of systematic reviews and meta-analyses

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Abstract: A growing body of literature demonstrated an association between exposure to ambient air pollution and maternal health outcomes with mixed findings. The objective of this umbrella review was to systematically summarize the global evidence on the effects of air pollutants on maternal health outcomes. We adopted the Joanna Briggs Institute (JBI) methodology and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) reporting standards for this umbrella review. We conducted a comprehensive search across six major electronic databases and other sources to identify relevant systematic reviews and meta-analyses (SRMAs) published from the inception of these databases up to June 30, 2023. Out of 2399 records, 20 citations matched all pre-determined eligibility criteria that include SRMAs focusing on exposure to air pollution and its impact on maternal health, reported quantitative measures or summary effects, and published in peer-reviewed journals in the English language. The risk of bias of included SRMAs was evaluated based on the JBI critical appraisal checklist. All SRMAs reported significant positive associations between ambient air pollution and several maternal health outcomes. Specifically, particulate matter (PM), SO₂, and NO demonstrated positive associations with gestational diabetes mellitus (GDM). Moreover, PM and NO₂ showed a consistent positive relationship with hypertensive disorder of pregnancy (HDP) and preeclampsia (PE). Although limited, available evidence highlighted a positive correlation between PM and gestational hypertension (GH) and spontaneous abortion (SAB). Only one meta-analysis reported the effects of air pollution on maternal postpartum depression (PPD) where only PM₁₀ showed a significant positive relationship. Limited studies were identified from low- and middle-income countries (LMICs), suggesting evidence gap from the global south. This review necessitates further research on underrepresented regions and communities to strengthen evidence on this critical issue. Lastly, interdisciplinary policymaking and multilevel interventions are needed to alleviate ambient air pollution and associated maternal health disparities.

Keywords: Ambient air pollution, Maternal health outcomes, Gestational diabetes mellitus (GDM), Hypertensive disorders of pregnancy (HDP), Preeclampsia (PE), Gestational hypertension (GH), Spontaneous abortion (SAB), Postpartum depression (PPD)

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