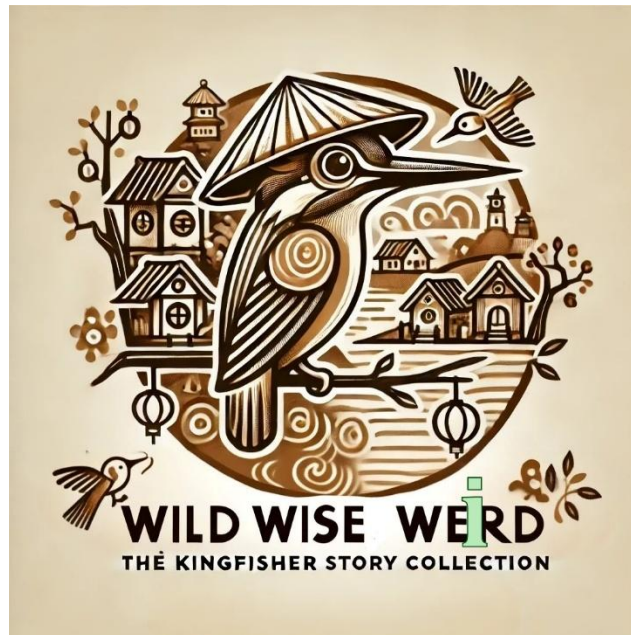


# Air Pollution and Children's Health: Why Vulnerability Matters More Than Exposure Alone

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“Looking at Coucal’s bloodshot eyes and sharp claws, accompanied by the rumor that every day he eats several tasty big snakes, other birds could only get vexed in bitter silence, as if that intellectual enlightenment thing never happened.”

In “The Great Master”; *Wild Wise Weird* [1]



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Air pollution is widely recognized as a significant threat to public health, particularly for young children. Yet, recent research by Castillo et al. [2] reveals that the burden of air pollution is not shared equally among all children. Drawing on comprehensive French administrative data encompassing 336,169 children born between 2008 and 2017, the study finds that children's health risks from air pollution are strongly shaped by socioeconomic vulnerability and early-life health conditions—rather than pollution exposure alone.

The researchers investigated the effects of temporary surges in fine particulate matter (PM<sub>2.5</sub>) levels—driven by natural phenomena such as thermal inversions and adverse wind patterns—on children's respiratory health. These short-term pollution shocks, which elevated annual PM<sub>2.5</sub> exposure by up to 2%, were found to increase the incidence of respiratory complications among infants [2]. Notably, children exposed to these pollution events faced a heightened likelihood of emergency hospitalization for bronchiolitis and were more likely to be prescribed asthma-related medications.

Crucially, these adverse health effects are not evenly distributed across the population. Approximately 10% of infants, primarily from lower-income families and those with poor birth health indicators such as premature birth or low birth weight, experience disproportionately severe impacts. For this vulnerable subgroup, exposure to pollution shocks increased the risk of bronchiolitis-related emergency admissions by as much as 33% compared to their baseline probability.

The study's findings call into question the prevailing policy focus on reducing pollution levels uniformly across regions. Castillo et al. [2] advocate for a vulnerability-based approach, emphasizing that policies should prioritize children who are most at risk. These at-risk groups can be identified through simple, observable indicators such as low household income or adverse birth conditions, including premature birth [3,4]. By tailoring interventions to target these vulnerable populations, mitigation efforts could become both more effective in improving health outcomes and more equitable in addressing social disparities.

Children's health outcomes are shaped not only by the level of exposure but also by pre-existing social and biological vulnerabilities. Tackling air pollution without addressing these underlying inequalities risks perpetuating, or even exacerbating, health disparities—leaving the most vulnerable children behind [5].

## References

- [1] Vuong QH. (2024). *Wild Wise Weird*. <https://www.amazon.com/dp/B0BG2NNHY6/>
- [2] Castillo MS, et al. (2025). Air pollution and children's health inequalities. *Journal of Environmental Economics and Management*, 131, 103149. <https://doi.org/10.1016/j.jeem.2025.103149>
- [3] Currie J, et al. (2023). What caused racial disparities in particulate exposure to fall? New evidence from the Clean Air Act and satellite-based measures of air quality. *American Economic Review*, 113(1), 71-97. <https://www.aeaweb.org/articles?id=10.1257/aer.20191957>
- [4] Hsiang S, et al. (2019). The distribution of environmental damages. *Review of Environmental Economics and Policy*, 13(1), 83-103. <https://doi.org/10.1093/reep/rey024>
- [5] Nguyen MH. (2024). How can satirical fables offer us a vision for sustainability? *Visions for Sustainability*. <https://ojs.unito.it/index.php/visions/article/view/11267>