Comments on National Ambient Air Quality Standards for Particulate Matter

ZERO TO THREE
Early connections last a lifetime

March 28, 2023

Docket Number: Reconsideration of the National Ambient Air Quality Standards for Particulate Matter — EPA-HQ-OAR-2015-0072

To whom it may concern:

Thank you for the opportunity to comment on the reconsiderations of Air Quality Standards for Particulate Matter (PM), or soot. I am responding on behalf of ZERO TO THREE, to bring the perspective of the considerable impact of particulate matter on the health and early development of young children, beginning prenatally.

Founded over 40 years ago, ZERO TO THREE is a national nonprofit organization located in Washington, DC, whose mission is to ensure that all babies and toddlers have a strong start in life. We translate the science of early childhood development into useful knowledge and strategies for parents, practitioners, and policy makers. We work to ensure that babies and toddlers benefit from the family and community connections critical to their well-being and healthy development. Our policy work encompasses the range of circumstances, including environmental conditions, that affect whether early development is strong or fragile.

While we appreciate the Administration's willingness to revisit the particulate matter standards, we are disappointed that the proposed changes do not go far enough to protect public health in general, and particularly the health and development of the youngest children as well as pregnant people, populations most vulnerable to its effects. Exposure to particulate matter can affect the health of young children and is associated with neurodevelopmental effects as well, both of which have long term consequences.

Exposure to harmful particulate matter is part and parcel of the inequities that our youngest children face, starting before birth. Slightly more than half of infants and toddlers are children of color. 40 percent of young children live in families with low income or in poverty. Clearly, a significant proportion of young children are in the income and racial/ethnic populations likely to experience higher levels of exposure. These children also are more likely to experience other conditions that undermine their development.

This risk to young children for problems that can follow them throughout their lives, undermining their development and future productivity—and therefore our nation's future—argues for decisive action to protect them in the strongest possible manner. We urge the Biden Administration to seize this opportunity to establish strong limits on soot pollution--no higher than 8 µg/m3 annual and 25 µg/m3 in 24 hours—to minimize at least this threat to early health and development.

Impacts of Exposure to Particulate Matter on Young Children

Particular matter exposure is most often associated with respiratory conditions. It has also been associated with poor birth outcomes, including infant mortality. Increasingly research points to

association with adverse impacts on neural development and other aspects of early health, including the immune system and cardiometabolic health.[i]

Respiratory System Impacts: Exposure to particulate matter has been found to affect rates of respiratory problems in young children, such as asthma, wheezing and coughing, in general suggesting that it can impact both lung development and functioning.[ii] It has a greater effect on the respiratory systems of young children for a host of reasons. Their respiratory muscles are immature, they breathe at higher rates, particles reach the lungs more easily through their shorter airways, and the immune system in their lungs is also less mature. Researchers have concluded: "Exposure to PM affects lung development in children, including irreversible deficits in lung function as well as chronically reduced lung growth rate and a deficit in long-term lung function. *There is no evidence of a safe level for PM exposure or a threshold below which no adverse health effects may occur.* The exposure is ubiquitous and involuntary, increasing the significance of this health determinant." [emphasis added][iii]

Most concerning, the impacts can start prenatally, where exposure can affect lung development and subsequent functioning. The developing fetus may be more sensitive to pollutants, which may cross the placenta and be more highly concentrated.[iv] One study examined the level of protection in the EPA standard of 35 µg/m3, with findings suggesting that a level of 20 µg/m3 would provide much better protection, closer to the WHO guideline of 25 µg/m3.[v]

Neural Development Impacts: The prenatal and early childhood risks extend beyond influencing lung development to neural development as well. Exposure to air pollutants, including PM, is associated with adverse birth outcomes such as preterm birth and low birthweight, which in turn place young children at higher risk for developmental delays.[vi] Researchers have found that in 2010, 3.3% of preterm births could be attributed to PM, with an estimated cost of $5.09 billion.[vii]

Research has found particulate matter exposure late in pregnancy or in early childhood to be associated with a risk of Autism Spectrum Disorder, with significantly increased risk in the third trimester and in early childhood. Effects started at low levels of exposure (8 µg m−3) and increased with higher levels of exposure.[viii] Other analyses find associations with physical brain development, cognitive functions, reduced IQ, and mental health symptoms.[ix]

While science has not established the lowest level of exposure to particulate matter for pregnant people and young children, below which effects would be negligible, indications do exist that the lower levels under consideration would be most prudent to promote positive health and neurodevelopment prenatally and in early childhood—the period with the most extensive impact throughout the lifespan. Natural experiments resulting in significant reductions in PM and other components of ambient air pollution have corresponded with improved health outcomes.[x] Other modeling of outcomes from the lowest standard of 8 µg/m3 found 30 percent higher mortality benefits per capita for individuals in poverty than the proposed level of 10 µg/m3.[xi] As discussed below, young children have high rates of experiencing low income or poverty.

Demographic Factors for Young Children

It is well established that people of color and those with low income are disproportionately likely to be exposed to high levels of PM and ambient air pollution in general. The demographic characteristics of infants and toddlers place a significant number of them at greater risk of exposure harmful to their development. The *State of Babies Yearbook 2022* shows that slightly more than half of all infants and toddlers are Black, Hispanic/Latine, American Indian/Alaska Native or other non-White racial and ethnic populations.[xii]

In addition, two in five (40.3 percent) infants and toddlers live in families with low income (200% Federal Poverty Level, or FPL) with almost half of those children living in poverty (18.6 percent of all infants and toddlers). Infants and toddlers of color are much more likely to live in families with low income, including outright poverty: 63 percent of AI/AN infants and toddlers, 61 percent of Black infants and toddlers, and 55 percent of Hispanic/Latine infants and toddlers live in families with low income.[xiii]

Babies of color and in families with low income are more likely to have experiences that place them at risk for health problems and developmental delay. Black infants in particular are more likely to have poor birth outcomes compared to the national average, including an infant mortality rate (10.8 deaths per 1,000 births) that is close to twice the national average (5.6 deaths per 1,000 live births). Their rate of low birthweight (14.2 percent) is 70 percent higher than the national average (8.3 percent), and the rate of preterm births (14.4 percent) is 40 percent higher than the national average (10.2 percent). Increased risk of exposure to pollutants including PM could be contributing to these high rates.[xiv] As noted above, preterm births and low birthweight increase risk of developmental delays.[xv]

Inequities for the youngest children are glaringly apparent, even before birth, and exposure to hazardous air pollutants is no exception. The American Academy of Pediatrics notes that despite overall improvement in air quality standards, in equities in exposure persist. Black and Hispanic/Latine individuals are more likely to live in areas that do not meet particulate matter standards. In addition, children in poverty are more likely to live in areas with higher risk from air pollutants.[xvi]

Young children also have concerning rates of other experiences that place their development at risk. 14.9 percent of infants and toddlers live in households with low or very low food insecurity. 15.4 percent live in crowded housing, including 24.4 percent of babies in families with low income, 26.7 percent of AI/AN babies, 23.2 percent of Asian babies, 17.6 percent of Black babies, and 27.8 percent of Hispanic/Latine babies. Almost 13 percent of babies in families with low income have two or more early adverse experiences, as well as 11.8 percent of Black babies.[xvii] All of these risk factors mount up, with higher likelihood of exposure to PM adding to the challenges for realizing the goal of health children who can reach their full potential.

Conclusion

Evidence continues to mount that exposure to particulate matter is hazardous to the health and neurodevelopment of young children, beginning in the prenatal period. The lifelong consequences of these impacts can be profound. Significant numbers of babies are in racial and ethnic or income subpopulations more likely to be exposed to higher levels of PM. This exposure occurs at a time of rapid foundational development, both physical and neurological, intensifying the risks. In addition, these young children also are more likely to be exposed to other experiences that can undermine development, including poor birth outcomes and material hardship.

The heightened sensitivity to inhaled particulate matter, which begins prenatally and continues into early childhood, should guide the Administration in setting the most stringent PM standards indicated by science. This period of development is too important to be left for reconsiderations of standards that are few and far between. The increased understanding of the critical importance of early neural and physical development on adult health and productivity urges strong steps to ensure this earliest development is a sturdy foundation for future growth and not a platform for preventable susceptibility to disease and developmental delay.

A disturbing fact in our country is that inequities start with our babies. A significant number face material hardship, health hazards, racism, and poverty. We should act to minimize the risks they face where we have the power to do so. Establishing strong soot regulatory levels would clearly minimize one of these risks. We urge the Administration to adopt levels no higher than 8 µg/m3 annual and 25 µg/m3 in 24 hours.

Sincerely,
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Senior Director of Federal Policy
ZERO TO THREE

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[xii] Keating, K., & Heinemeier, S. (2022) State of babies yearbook 2022. ZERO TO THREE, www.stateofbabies.org

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[xvi] Brumberg, et al.

[xvii] Yearbook.