

Diane K. Caldwell, Doreen Dickerson, Tiffany Duester, Mariana Guercio, Joseph LaTassa, Nyla Phillips, Tracey Roger, Melissa Smith

### Introduction

- Air pollution and climate change impair cognitive and behavioral development, respiratory health, and can cause an array of other illnesses both in-utero and throughout the life course.
- 40% of the health effects caused by environmental pollutants, and 88% of the burden of health effects caused by climate change involve children under the age of 5.
- In-utero fetuses and young children exposed to environmental pollutants are most susceptible to reproductive challenges due to their still-developing biological systems (Perera, 2017).
- There has been a nationwide increase in the prevalence of neurodevelopmental disorders. Approximately 15% of children in the US between 3 and 17 are diagnosed with ADHD, learning disabilities, intellectual disability, cerebral palsy, autism, seizures, and other neurodevelopmental deficits (Kalia et al., 2017).

### Research Question

**What impact do environmental toxins have on neurodevelopment and how can the social work profession respond to and mitigate these effects?**

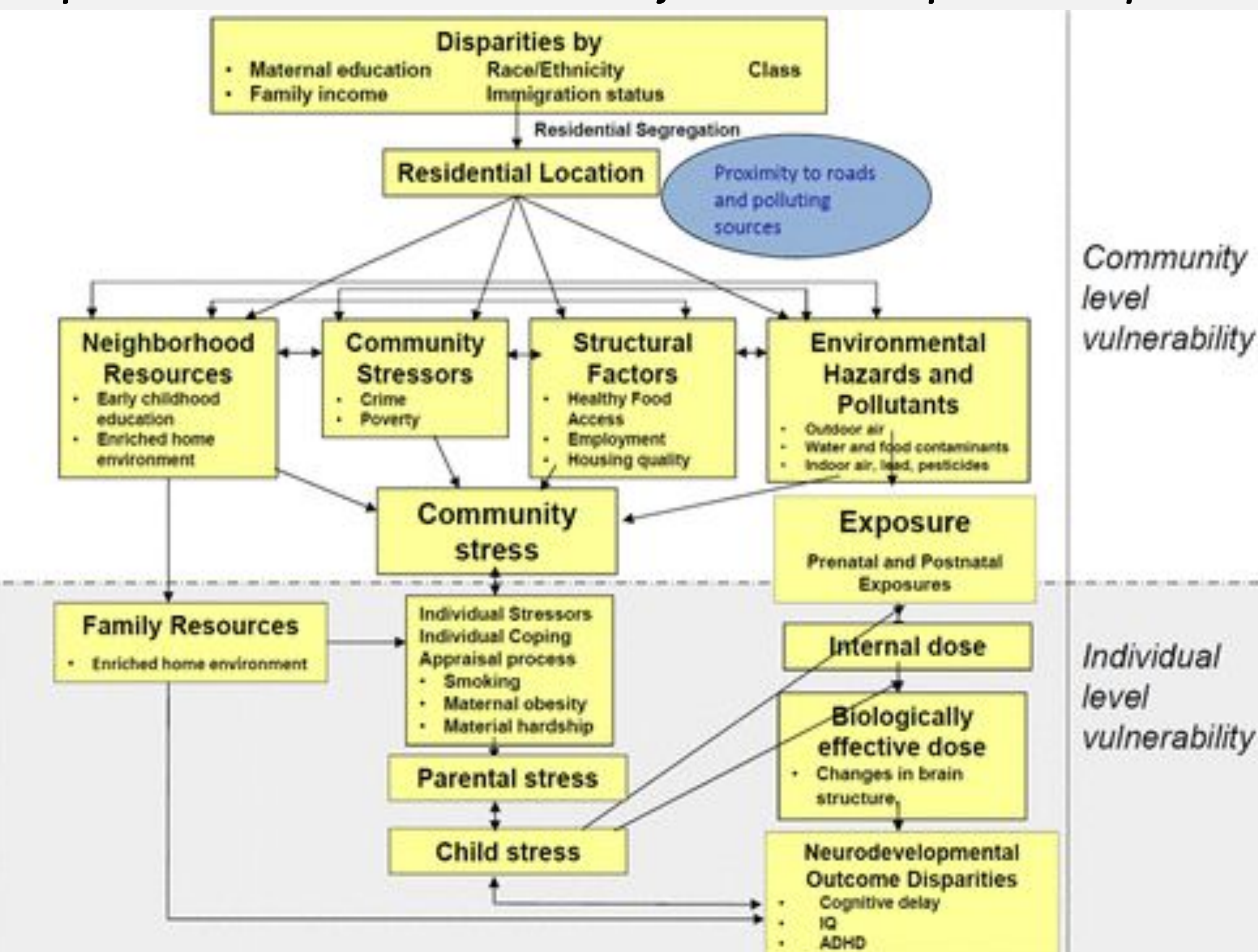
### Methods

- We used Adelphi University’s OneSearch database to locate relevant peer-reviewed research articles and published works.
- Search terms included combinations of the following: “neurodevelopment,” “environment,” “environmental exposure,” “environmental toxins,” “brain development” “pollutants,” “pollution,” “autism,” “ASD,” “social work,” “intervention,” “social justice,” and “neurocognitive.”
- Group members were sorted into working groups to focus on two primary research areas: (1) The impact of environmental toxins on neurodevelopment and (2) social work intervention and response. Group members provided key highlights, takeaways, and discussion in a shared Google Doc.

### Results

- Exposure to organophosphates during pregnancy is correlated with an increased risk for autism spectrum disorders (ASD) of 60% – third trimester exposures and second-trimester exposure to chlorpyrifos were also associated with higher risk (Shelton et al., 2014).
- Chemical hazards are more widespread within low-income communities, which can result in abnormal development of the central nervous system (Schwartz, et al., 2011). However, children from these communities often struggle with access to care compounded by poor reimbursement rates for healthcare providers who can offer diagnosis/treatment.
- ASD is especially underdiagnosed in Black and Latino children (Aylward et al., 2021).

**Figure 1**  
*Exposure–Disease–Stress Framework for neurodevelopmental disparities*



Adapted from “Defining and intervening on cumulative environmental neurodevelopmental risks: Introducing a complex systems approach,” by Payne-Sturges, D.C., Cory-Slechta, D.A., Puett, R.C., Thomas, S.B., Hammon, R., and Hovmand, P.S, 2021, *Environmental Health Perspectives*, 129(3), p. 035001-4 (<https://doi.org/10.1289/EHP7333>)

- Children are at greater risk for both ASD and developmental delay if born from mothers living near pyrethroid insecticide applications prior to conception or throughout the third trimester (Shelton et al., 2014).
- Air pollution is associated with 600,000 deaths each year in children under five years of age (Perera, 2017).
- Synthetic chemicals influence endogenous hormones and other various signaling chemicals of the endocrine system, which negatively affect brain development. Pituitary disruptions are also evident (Colborn, 2004).
- Disruptions in the establishment, maintenance, or reading of DNA methylation are correlated with neurodevelopmental disorders (Rock & Patisaul, 2018).
- Exposure to environmental toxins, in addition to maternal stress and malnutrition, can lead to abnormal brain development and manifestation of neurodevelopmental disorders (Rock & Patisaul, 2018).
- From 2014 through 2018, there was a 13% increase in the prevalence of an ASD diagnosis in children up to 48 months (Aylward et al., 2021).

### Connection to Social Work

- The incorporation of neuroscience into social work can help social workers strengthen the ability to address social justice issues and promote child, family, and community welfare by providing a multi-modal approach to practice and research; create opportunities to enhance intervention effectiveness; and advocate for communities more heavily impacted by or in danger of exposure to environmental toxins.
- Neuroscience can be especially useful for understanding when children and adolescents are susceptible to environmental impacts due to the brain’s adaptability and responsiveness to change and can help social workers apply proactive interventions to limit these impacts (Black & Conway, 2018).
- Social workers can provide early intervention to foster motor skills development, training attention, and teaching executive functioning skills to help reduce negative effects of environmental exposure and increase neurocognitive abilities in children (Romer et al., 2007; Halperin et al., 2012).

### References

