

NANOPLASTICS POLICY BRIEF

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URGENT: Nanoplastics Amplify Deadly Bacteria

Peer-reviewed evidence shows nanoplastics triple Shiga-toxin output in *E. coli*

EXECUTIVE SUMMARY

Recent peer-reviewed research published in the Journal of Nanobiotechnology (April 2025) demonstrates that nanoplastics exposure significantly amplifies bacterial virulence, particularly in Shiga-toxin producing *E. coli* (STEC). This finding has immediate implications for public health, as nanoplastics are now ubiquitous in our environment and detected in human tissues including newborn placentas. The study reveals that *E. coli* exposed to nanoplastics produces 3.4^x more Shiga toxin, a potent bacterial toxin responsible for severe foodborne illness and hemolytic uremic syndrome.

SCIENTIFIC BACKGROUND

Nanoplastics are plastic particles smaller than 1 micrometer that result from the breakdown of larger plastic items or are manufactured for industrial use. These particles have been detected in: human blood, lung tissue, liver, spleen, kidneys, and most concerningly, in every newborn placenta tested to date. The particles serve as surfaces for bacterial attachment and biofilm formation, creating microenvironments that enhance bacterial growth and toxin production.

KEY FINDINGS

- Nanoplastics detected in 100% of newborn placentas tested (n=62)
- *E. coli* exposed to nanoplastics produces 3.4^x more Shiga toxin
- England reports 26% spike in STEC infections (2024 vs 2023)
- Industry aware of contamination since 1973, no action taken
- Nanoplastics found in 90% of bottled water samples tested
- Average person ingests 5 grams of plastic per week
- STEC infections cause 265,000 illnesses annually in the US

PUBLIC HEALTH IMPLICATIONS

The amplification of bacterial virulence by nanoplastics represents a significant public health threat. STEC infections can lead to hemolytic uremic syndrome

children and the elderly. The 26% increase in STEC infections in England coincides with rising environmental nanoplastics levels, suggesting a potential causal relationship. Additionally, nanoplastics may amplify other pathogenic bacteria, including *Salmonella*, *Listeria*, and antibiotic-resistant strains.

REGULATORY GAPS

Despite decades of awareness, there are no federal regulations governing nanoplastics in food, water, or consumer products. The FDA lacks specific guidelines for nanoplastics in medical devices or pharmaceutical products. Environmental Protection Agency (EPA) has no drinking water standards for