**Microplastics in Drinking Water: Small Enough to Enter Cells, Below Detection Limits**
Tiny particles, pervasive problem. Drinking water contains microplastics, yet regulatory gaps leave us without clear answers on the risks and solutions.

Around the world, microplastics are slipping into our drinking water, and most of us have no idea.

A recent study from France has found that most microplastics in bottled and tap water are even smaller than detection limits account for, raising concerns about how safe our drinking water actually is.

Currently, the European standard focuses only on particles larger than 20 micrometers. However, the study revealed that most microplastics in drinking water fall below this threshold, highlighting a significant gap in detection capabilities.

“All evidence suggests that it’s the smaller particles that may have the highest impact on human health,” lead study author Oskar Hagelskaer, who holds a doctorate in atmospheric microplastic pollution, told The Epoch Times. He noted that testing methods need to focus on these smaller particles.

While the study adds to mounting evidence of microplastic contamination and is supported by recent U.S. findings, it underscores the need for more accurate detection worldwide, especially as the United States has yet to set a standard for microplastics in drinking water.

**What the Numbers Tell Us**
Published in PLOS Water on Jan. 15, the study found that 98 percent of microplastics detected were smaller than 20 micrometers, with 94 percent smaller than 10 micrometers. For context, a human hair is about 70 micrometers thick, while a red blood cell is roughly 8 micrometers across.

Microplastic concentrations in both bottled and tap water varied, ranging from just 19 particles to over 1,100 per liter. For reference, a liter is about two standard-size bottles of water in the United States.

“The highest concentration we found was 1,154 particles per liter,” Hagelskjaer said. “In terms of mass, it’s very, very little. We’re talking parts per billion.”

To put it into perspective, the amount of microplastics in bottled water is much smaller than what we’re exposed to from other sources like air and food. There is no universal threshold for safe microplastic exposure, but these findings depict the ubiquity of microplastics in the environment and reveal a need for clearer guidelines.

Smaller microplastics can pass through the digestive system and enter the bloodstream, traveling throughout the body and building up in organs and tissues. Research has detected these particles in almost every part of the body. While studies suggest these particles may disrupt hormones or even increase cancer risk, the full potential of the harm they pose remains unclear.

The tests researchers conducted for the recent study involved 10 brands of bottled water and one tap water sample from Toulouse, France. The tap water contained more microplastics than eight other bottled water samples, with 413 microplastic particles per liter.

Though tap water had more microplastics than most of the water bottles, Hagelskjaer said that this did not necessarily mean all tap water would have more microplastics than most bottled water. Some of the microplastics may have gotten into the tap water during the water treatment process, but Hagelskjaer acknowledged this was speculative.

Microplastics could also have entered Toulouse's tap water through environmental pollution—for instance, via plastic waste runoff from nearby rivers.

Overall, the study suggests that microplastic concentrations in bottled water and treated surface water, which is distributed as tap water, are similar.

This contamination is part of a continuous environmental cycle.

**Microplastic Contamination: A Continuous Cycle**

Microplastics in drinking water are part of a larger cycle of contamination, and water is just one entry point. Drinking water accounts for less than a third of our total microplastic exposure; most microplastics come from other sources like food, air, and dust, contributing to this broader environmental cycle.

Mathew Campen, a toxicologist from the University of New Mexico, told The Epoch Times that we need to understand the interconnectedness of these sources.

"Think about how we get food in this country," Campen said. "We take water, which has microplastics in it, and we irrigate fields with it, and that gets into our crops," which are then consumed by livestock, ultimately entering the food chain.

But the cycle doesn't end there. Campen added that some of this water evaporates, releasing microplastics into the air. Some particles have even been found in clouds.

When it comes to air exposure, Thais Mauad, professor of medicine at the University of São Paulo, told The Epoch Times she believes that we inhale more microplastics indoors than outdoors due to the widespread presence of plastics in textiles like clothing, bedding, and carpet.

Circling back to water, washing machines contribute significantly to this cycle. Studies show that washing machines account for about 35 percent of all microplastic pollution in the oceans, releasing billions of microfibers into both water and air each year. These synthetic fibers—made from materials like polyester and nylon—are released during washing and can enter the water system through wastewater. Wastewater treatment plants are not designed to thoroughly remove such tiny particles, allowing some to enter the water system.

Once these microfibers are released into the environment, they eventually make their way back into drinking water through rainfall runoff or inadequate water filtration.

**Inside Bottled Water**

Most of the microplastics Hagelskjaer and his team detected did not come from the polyethylene terephthalate (PET) bottles containing them. PET is commonly used in packaging. While PET particles were found in seven out of 10 bottled water samples, they accounted for less than 5 percent of the microplastics detected in three of those seven samples.

It is possible that other factors, like storage conditions or filtration methods, introduce plastics into the bottled water, suggested Hagelskjaer.

The study also identified 17 types of plastic, with polyethylene and polypropylene being the most common. Due to their resistance to heat and chemicals, these plastics are used in water filtration system components like pipes and filters. This suggests the microplastics in bottled water could potentially come from the water treatment process itself.

Hagelskjaer said that this challenges the assumption that plastic bottles are the primary source of contamination, highlighting the complexity of microplastic pollution in bottled water.

**Regulatory Gaps**

The U.S. Food and Drug Administration (FDA) oversees bottled water, but according to the International Bottled Water Association, the FDA's "quality standards are the same as the Environmental Protection Agency (EPA) maximum contaminant levels for tap water systems," meaning bottled water is not held to a higher standard. The EPA has not established limits or guidelines for microplastics in drinking water, leaving a regulatory gap. According to the EPA's website, while standard methods for collecting microplastic samples exist, the techniques for analyzing them are still developing. Many methods are lab-based and not suited for large-scale field monitoring. Additionally, distinguishing microplastics from other debris, such as sediment, remains a challenge. As a result, Americans may be unknowingly consuming microplastics from both bottled and tap water without clear safety standards.

The EPA is working with research organizations to refine detection technologies, but a reliable, field-ready method is still in progress. Meanwhile, its focus has been on other environmental threats like per- and polyfluoroalkyl substances (PFAS), recognized as more urgent health threats, leaving microplastics to receive less attention.

Without reliable testing and clear regulations, the extent of microplastic contamination remains unknown. States can create their own laws, but regulatory action often lags behind scientific advancements.

The Epoch Times reached out to the EPA for insight into its efforts regarding microplastics in drinking water. As of publication time, there has been no response to several questions about when—or if—the EPA will introduce federal guidelines and testing methods, particularly for particles smaller than 20 micrometers.
As these regulatory gaps persist, many are turning to home filtration systems.

**Removing Microplastics: A Complex Challenge**

Most home filtration systems are primarily designed to filter out contaminants like chlorine and heavy metals, which are known health risks. However, these filters are generally not intended to target microplastics. Advanced filtration technologies, such as reverse osmosis (RO) and ultrafiltration, can effectively remove microplastics from drinking water, with both systems using membranes small enough to filter out these particles.

While both methods can significantly reduce microplastics in drinking water, RO systems are slower, produce wastewater, and remove beneficial minerals like calcium and magnesium, which are important for health. In contrast, ultrafiltration works faster, produces no waste, and retains these essential minerals but is slightly less effective at removing finer microplastics.

Since drinking water is just one source of microplastic exposure, installing these systems throughout an entire house may be required, but Hagelskjaer noted that this can be cost-prohibitive.

**Can ‘Microplastic-Free’ Certification Help the US?**

Hagelskjaer has proposed a “microplastic-free” certification for bottled water in the European Union. This certification would establish a strict limit for microplastics, requiring the labeling of bottled water to indicate contamination levels and providing people with a transparent way to choose cleaner options.

Given that roughly 64 percent of bottled water in the United States is essentially tap water, this certification could require testing and microplastic removal at both water treatment facilities and bottling plants to ensure certification.

Hagelskjaer is working to establish a European certification process that sets an ultralow threshold for microplastics—0.01 parts per billion—effectively designating certain bottled waters as “microplastic-free.