Ocean Conservancy

Microplastic Fibers Facts and Figures

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What are microplastic fibers?

Microplastic fibers (also referred to as plastic microfibers) are thread-like materials less than 5mm in length. Those derived from synthetic or semi-synthetic materials are considered a kind of microplastic (Marine Pollution Bulletin, Environmental Toxicology & Chemistry).

While annual emission estimates vary widely, scientists estimate that an average of 211,000 metric tons of microplastic fibers are emitted annually to the ocean (Science). That's equivalent to over 1 billion t-shirts entering the environment every year.

Sources

Clothing and textiles:

Microplastic fibers are produced across the lifecycle of clothing, from the production process (like weaving, cutting, sewing, wet processing and dyeing (Environmental Chemistry)) to normal clothing wear and laundry.

Up to 18 million microfibers may be released from a single load of laundry (Environmental Science and Pollution Research). One study reported 5.6 million metric tons of microplastic fibers were released from apparel washing from 1950 to 2016, with half of this amount emitted between 2006-2016 (PLOS ONE).

Higher washing temperatures and longer washing times increase microfiber release and shedding (Environmental Pollution).

The rubbing of clothing and fabrics during use can release up to 640,000 fibers per gram of material (Science of the Total Environment).

Textiles with loose construction such as fleece may shed more, whereas high-twist yarns comparatively shed fewer microfibers (Environmental Science and Pollution Research; Environmental Science and Technology). One study found that polyester fleeces release 6x more microfibers per wash than woven nylon (PLOS ONE).

Tumble drying may cause a 3.5x increase in microfiber shedding compared to washing, and these microfibers are released from dryer vents directly into the environment (Environmental Science and Pollution Research, PLOS ONE). In only 15 minutes, tumble drying can release over half a million microfibers into the air (Environmental Science and Technology Letters).

Cigarettes:

It is estimated that a cigarette butt is made of over 15,000 microplastic fibers. Every year, cigarette butt pollution releases roughly 275,000 metric tons of microplastics into the environment (Science of The Total Environment).

Microplastics from cigarette butts can contain more than 4,000 toxic chemicals including tar, and heavy metals like arsenic and lead (Waste Management).

Other sources:

Disposable wet wipes, medical face masks, and feminine hygiene products are also sources of microplastic fibers in the environment (Water Research; Environmental Challenges).

Billions of microplastic fibers can be released by a single disposable face mask as it degrades in an aquatic environment (Science of the Total Environment).

Environmental Impact

Many scientific studies report that microfibers are the most common microplastics in environmental samples and in some studies, representing over 90% of all microplastics ingested by marine animals (Environmental Pollution; Environmental Pollution; Marine Pollution Bulletin; Environmental Chemistry Letters, Marine Pollution Bulletin).

Researchers have found that more than 1/3 of all microplastics in the ocean originate from synthetic textiles (IUCN).

Ingestion of microfibers by wildlife has been associated with reduced food consumption, reduced energy for growth, and altered gene expression (Water). In some species, microfibers can also block digestive tracts, cause insufficient nutrient absorption, and internal damage (Environmental Science and Technology).

Microfibers are produced with synthetic chemicals and have been shown to absorb and carry pollutants. These chemicals can then be passed on to wildlife when ingested (Marine Pollution Bulletin).

Microfibers from washing machines end up in biosolids from wastewater treatment, which are often used to fertilize animal feed crop fields, spreading microplastics on these lands (Current Opinion in Environmental Science & Health).

Human Health

Recent Ocean Conservancy-led research revealed adults in the U.S. consume up to 3.8 million microplastics a year from proteins alone (Environmental Pollution).

Inhalation of airborne microplastic particles is a major route for human exposure to these pollutants. Most of the microplastics we inhale are likely microfibers (Environmental Science & Technology).

Inhaled microfibers have been found in lung tissues, where they can cause inflammation, cell and tissue damage, or respiratory lesions (Science of the Total Environment; Science of the Total Environment). Bacteria and pathogens can also be found on the surface of microplastics and, when ingested by animals and humans, have the potential to spread disease (Trends on Food Science and Technology; Trends in Microbiology).

Solutions

The installation of washing machine filters is an effective, near-term way to reduce microplastic fiber pollution at the source. Studies comparing microfiber capture products found built-in or in-line filters reduce microfiber pollution in wastewater by up to 87% (PLOS ONE, Marine Pollution Bulletin).

When tested in 10% of households in a small Canadian community, washing machine filters significantly reduced microfibers in wastewater by up to 14 billion microfibers per year (Frontiers in Marine Science).

An economic analysis conducted in 2023 estimated the cost increase for including microfiber filters in new residential washing machines would be only $14 to $20 per machine. (The Blue Sky Consulting Group).

According to polling conducted by Ocean Conservancy in 2026, 4 in 5 Americans support requiring all new washing machines manufactured in the U.S. to have built-in microfiber filters by 2030 and are willing to pay $20 more for a machine with such filter.

Educational campaigns, deposit schemes, and smoking bans in sensitive environments to address cigarette litter can help decrease microplastic fiber pollution generated from cigarette butts (Journal of Hazardous Materials). Ocean Conservancy helped pass HB105 in Florida which enables municipalities to ban smoking on local beaches, reducing microplastic fiber pollution.

Improvements to textile properties are another area of opportunity to reduce microfiber pollution. Textile manufacturers could prioritize products with high-twist fibers with high tensile strength and avoid mechanically finished fabrics like fleece (Environmental Science and Pollution Research).

Individuals can help decrease laundry microfiber emissions by washing clothing in colder water, shorter wash cycles, and air-drying instead of tumble-drying (PLOS ONE).