

ECG Early Careers Environmental Brief No. 10

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Single use plastic pandemic: the rise in disposable plastic pollution during the COVID-19 pandemic

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Since the start of the COVID-19 pandemic, the use of disposable plastic products has soared. Previous bans that prohibited their use have been lifted, and many personal protective equipment (PPE) products, including masks and gloves, have also been produced *en masse*, most of which are single use and non-biodegradable. Together, these effects compound the already considerable worldwide plastic pollution issue.

Reasons for single-use plastic increases

Reducing viral transmission PPE has been mass-produced to slow transmission, *e.g.* masks that protect the wearer and others from inhaling droplets which may contain microbes (1).

Legal obligations The public have been legally obliged to wear a face mask in shops and on public transport since the 24th of July in the UK (2).

Oil industry collapse During lockdown, the demand for petroleum dropped dramatically worldwide. This reduction meant that recycling plastics became more expensive than the production of virgin plastic and products such as disposable cups, straws, and plastic bags resurfaced (3).

Individual choices Lockdown measures have led to an increase in takeaways and home deliveries due to the closure of restaurants and avoidance of supermarkets.

Statistics

In February 2021, China manufactured 12 times the typical number of disposable facemasks, with a total of 166 million produced per day (4). Globally, approximately 65 billion gloves and 129 billion facemasks have been used per month. If this usage rate continues, there will be enough waste to cover the surface area of Switzerland in 1 year (5).

Local case study

Increase in plastic waste production has put pressure on normal waste management strategies, leading to the use of unsustainable practices such as local burning (which releases dioxins into the environment) and direct discharge into landfills. If just 1% of facemasks were disposed of incorrectly, this translates to more than 10 million items (3), which have littered the streets or entered the ocean. A short cycle through Reading uncovered 15 masks and a collection of other single use plastics, as documented in Figure 1.

Disposable facemasks are typically composed of plastics, including polyurethane, polypropylene and polyacrylonitrile. Once in the environment, they can be globally distributed by wind, rivers, and ocean currents. The masks can entangle or be ingested by animals and may eventually be broken down into microplastics (6).

There remains ambiguity surrounding the definition of microplastics, but they are generally agreed to be



Figure 1. Photos of single use plastic found along a six km route in Reading on 13th November 2020.

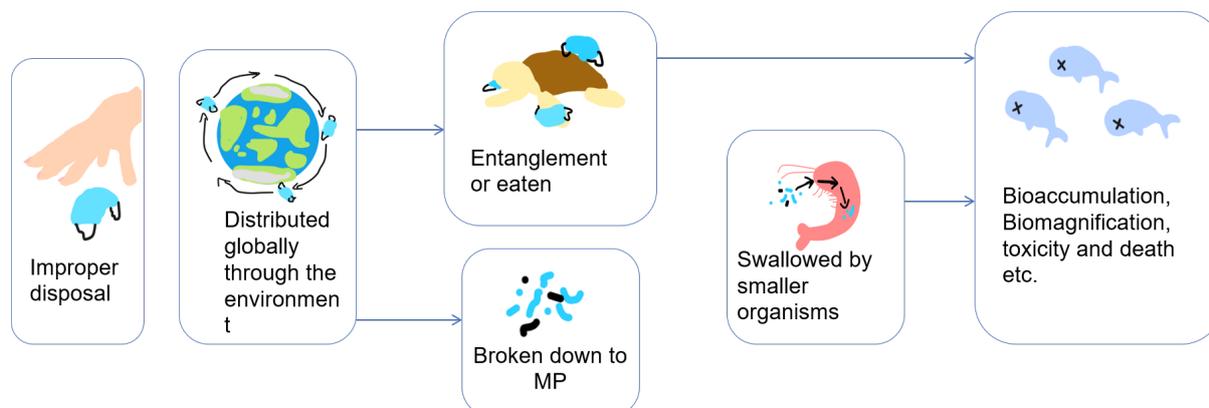


Figure 2. The movement of disposable facemasks through the environment and their impact on wildlife.

< 5 mm (7). Once ingested, they can cause internal physiological damage by blocking the digestive tract and organs, increase satiety and thus reduce ingestion and nutrition and, in some cases, cause death. Microplastics are known to have elevated mortality in freshwater fleas after ingestion (8). In addition, if ingested by mesopelagic fish species such as the Lantern fish, microplastics increase the fish's buoyancy

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and prevent them from returning to deep waters, ultimately resulting in mortality (7). Not only do microplastics affect individual organisms, but they also bioaccumulate in food chains, negatively impacting species at all tropic levels. Microplastics have been observed continually accumulating in 66% of marine mammals and 100% of sea turtles (7), where they may act as a sink for persistent organic pollutants (POPs) such as polybutylene and terephthalate (PBT). Once ingested, lipid-soluble PBT leaches down the concentration gradient, into the tissues of consuming organisms where it is able to enter the food chain and bioaccumulate (9). Unfortunately, plastics are highly persistent in the environment, and we are likely to see PPE pollution from the coronavirus pandemic remaining for subsequent decades (5).

Solutions/alternatives

Proper disposal Masks should be sealed in plastic bags and put in the general waste bin. The public should be made aware of the consequences of not doing so, as explained in the examples listed above (5). Cutting off the ear straps on face masks before disposal prevents entanglement.

Reusable/homemade masks Present environmental benefits, but may be less effective at reducing viral transmission and may compound the pollution associated with fast fashion (1).

Conclusions

The COVID-19 pandemic has caused an increase of plastics in the environment, which have resulted in the negative impacts discussed. While there are some measures in place to mitigate these issues, ultimately, it is likely that only after the world recovers will we be able to focus on reversing environmental damage.

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