MOD007691

Assignment E010

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# Preventing Pollution from PPE (PPP)

# Introduction

1. The Chartered Institute of Environmental Health (CIEH) represents Environmental Health practitioners (EHPs) across the UK.
2. Since 1883 CIEH has developed and promoted environmental standards that contribute to better public health and is responsible for training and accrediting EHPs.
3. Our mission is:

*“Safer, cleaner and healthier environments for the benefit of all”*

1. EHPs work in local authorities and independently to ensure food safety standards, environmental protection and support general health improvement.
2. We welcome the opportunity to submit evidence on the growing threat plastic pollution poses to food safety, the environment and public health.
3. In particular we want to draw attention to the developing burden of plastic pollution posed by single use plastics contained with Personal Protective Equipment (PPE) which is a consequence of the COVID19 pandemic.

# Evidence

## The scale of plastic pollution

1. Since the1950s more than 8.5 billion tons of plastic have been generated globally, of which an estimated 600 million tons have been recycled (7%) and 5700 million tons (67%) have been discarded or burned.[[1]](#footnote-22) plastic waste.(Geyer, Jambeck, and Law (2017)) Over than 300 million tons of are produced each year, of which 40% are single-use.(Waring, Harris, and Mitchell (2018))
2. In a single year over 10 million tons of plastic waste is estimated to enter the oceans from the 192 coastal countries around the world. (Jambeck et al. (2015))
3. Most plastic waste ends up in landfill sites, waterways and the oceans. (Ritchie and Moser (n.d.))
4. The effect of ultra-violet light in combination with attrition from wind and waves degrades larger plastic pieces into microplastics (MPs) - particles < 5mm in size; and nanoplastics (NPs) - particles under 0.1 micrometer.
5. Although macroplastics can directly harm larger animals, MPs and NPs are now ubiquitous in the environment and there is widespread human and ecosystem exposure.
6. Microplastic pollution has been found in the Antarctic (Cunningham et al. (n.d.)), and in deep-sea marine animals in the Mariana Trench at a depth of 10,000m. (Jamieson et al. (2019))

### PPE pollution

### PPE volumes

1. A study using crowdsourced data from the Litterati app in 14 countries found an increase in COVID related litter (masks, gloves and wipes) pre to post declaration of the COVID pandemic.@roberts2021 The overall volume of litter was also related to lockdowns.
2. In the UK, the proportion of COVID related litter grew from 4% of items in 2019, to over 8% of items in the latter half of 2020.
3. The proportion of reported litter related to COVID was higher in the UK than other countries.
4. Chowdury et al estimated face mask use across countries as:

## Human exposure to microplastics

1. There are 3 main routes for human MP exposure - ingestion, inhalation and transdermal (through the skin).
2. Ingestion occurs principally through consumption of contaminated drinking water and seafood. Most MPs will pass through the digestive system but there is evidence that PMs can enter the body through lymphoid tissues in the gut (Peyer’s patches) where the particles can be ingested by specialised M-cells. This can lead to localised inflammation.
3. One study comparing MP excretion in 50 healthy adults with 52 patients with Inflammatory Bowel Disease, found significantly more items in the faeces of the IBD group than the healthy group (41.8 items/gm vs. 28.0 items/gm).@yan2022
4. Inhalation - microfibres from clothing, tyre and road wear

### Airborne

### Food and gut health

### Measuring exposure

* MPs have been found in human faeces and
* In one Italian study of 6 post-partum plcental tissues using Raman specostrcopy[[2]](#footnote-28) found evidence of MPs in 4. (Ragusa et al. (2021))

## Potential harmful effects

### Cellular effects

### GI effects

### Neurotoxicity

## Future threats

# Recommendations

1. Actions to reduce exposure
2. Waste management
3. Improved measurement and surveillance of exposure
4. Sewage and water
5. Plastic

# References

Cunningham, Eoghan M, Sonja M Ehlers, Jaimie T A Dick, Julia D Sigwart, Katrin Linse, Jon J Dick, and Konstadinos Kiriakoulakis. n.d. “1 High Abundances of Microplastic Pollution in Deep-Sea Sediments: 2 Evidence from Antarctica and the Southern Ocean,” 29.

Geyer, R, K. L. Jambeck, and J. R. Law. 2017. “Production, Use, and Fate of All Plastics Ever Made.” *Science Advances* 3 (e1700782): 1–5. <https://www.science.org/doi/10.1126/sciadv.1700782>.

Jambeck, Jenna R., Roland Geyer, Chris Wilcox, Theodore R. Siegler, Miriam Perryman, Anthony Andrady, Ramani Narayan, and Kara Lavender Law. 2015. “Plastic Waste Inputs from Land into the Ocean.” *Science* 347 (6223): 768–71. <https://doi.org/10.1126/science.1260352>.

Jamieson, A. J., L. S. R. Brooks, W. D. K. Reid, S. B. Piertney, B. E. Narayanaswamy, and T. D. Linley. 2019. “Microplastics and Synthetic Particles Ingested by Deep-Sea Amphipods in Six of the Deepest Marine Ecosystems on Earth.” *Royal Society Open Science* 6 (2): 180667. <https://doi.org/10.1098/rsos.180667>.

Ragusa, Antonio, Alessandro Svelato, Criselda Santacroce, Piera Catalano, Valentina Notarstefano, Oliana Carnevali, Fabrizio Papa, et al. 2021. “Plasticenta: First Evidence of Microplastics in Human Placenta.” *Environment International* 146 (January): 106274. <https://doi.org/10.1016/j.envint.2020.106274>.

Ritchie, H, and M Moser. n.d. “Plastic Pollution.” <https://slides.ourworldindata.org/plastic-pollution/#/1>.

Waring, R. H., R. M. Harris, and S. C. Mitchell. 2018. “Plastic contamination of the food chain: A threat to human health?” *Maturitas* 115 (September): 64–68. <https://doi.org/10.1016/j.maturitas.2018.06.010>.

1. The rest is still in use [↑](#footnote-ref-22)
2. A technque for charactising plastic particles [↑](#footnote-ref-28)