

Breast Cancer UK Submission to Health & Safety Executive call to evidence on PFAS Regulatory Management Options Analysis January 2022

1. Executive Summary

Breast Cancer UK is extremely concerned about the global contamination of humans from per and polyfluoroalkyl substances (PFAS). Growing scientific evidence highlights the public health impacts of PFAS and their association with increased breast cancer risk. Due to their extreme persistence, mobility, toxicity, endocrine disrupting properties and ability to bioaccumulate in humans, these chemicals **pose a direct risk to the health and wellbeing of current and future generations.**

With DEFRA and the Health & Safety Executive reviewing regulatory measures for the management of PFAS, **we strongly recommend the UK Government implements a comprehensive group-based restriction and phase out unnecessary use of PFAS in consumer products,** to ensure UK REACH delivers on its goal of delivering a high level of protection for human health and the environment.

2. About Breast Cancer UK

Breast Cancer UK is dedicated to the prevention of breast cancer by tackling the environmental and lifestyle causes of the disease including exposure to carcinogenic and endocrine disrupting chemicals found in everyday products that enter our environment. We fund research into the environmental and chemical causes of breast cancer. We educate the public on actions individuals can take to reduce their risk and campaign to strengthen public protections from harmful chemicals.

Breast Cancer is the most diagnosed cancer in the UK – over 56,000 people are diagnosed every year and countless more are affected by the diseaseⁱ, yet it's estimated 1 in 4 breast cancers are preventableⁱⁱ. It's time for a fresh approach to cancer prevention, including actions to reduce public exposure to harmful chemicals in everyday products and the environment linked to breast cancer.

Breast Cancer UK is an accredited stakeholder of the Health & Safety Executive and member of the UK Chemicals Stakeholder Forum.

3. How do PFAS affect Human Health?

PFAS are commonly known as “Forever chemicals” due to their environmental persistence. They are a group of over 4,700 synthetic chemicals used since the 1940s in consumer and industrial products. They do not naturally occur in the environment. PFAS are ubiquitous, toxic to humans, extremely persistent, mobile (travel readily) and have become widespread in the environment. Some PFAS have half-lives of 1000 yearsⁱⁱⁱ. PFOA (perfluorooctanoic Acid) and PFOS (perfluorooctanesulfonic acid) were the most used PFAS and are now the most common environmental contaminants of the PFAS family. PFAS are water soluble, build-up in human body fluids and are routinely found in the blood, urine, placenta, umbilical cord and breastmilk of people all over the world. Today, children are being born pre-polluted with PFAS, putting the health prospects of future generations at risk.

PFAS pollution has been linked to numerous public health conditions, from thyroid disease, liver damage, lower birth weight, obesity and diabetes to an increased risk of breast, kidney and testicular cancer^{iv}. Recent data suggest PFOA may accumulate in lungs and cause upregulation of enzymes involved in SARS-CoV2 infection, potentially leading to higher susceptibility to Covid-19^{vi}. There is growing evidence which suggests PFAS have impacts on fertility and developmental and behavioural problems^{vii}. The risk from harmful chemicals is exacerbated when exposure occurs to

vulnerable groups including children, pregnant women and the developing foetus^{viii}. PFAS contaminates our air, water and soil, infiltrating our food chains, our homes and the environment.

4. Growing concerns from Global Human Biomonitoring Data

Human biomonitoring studies of PFAS are being conducted in numerous countries including the US, Canada, China and EU member states^{ix}. These studies demonstrate PFAS is ubiquitous in blood. Whilst levels of the well-studied and regulated long-chain PFAS, PFOA and PFOS (banned under the Stockholm Convention) are decreasing, they remain widespread in human body fluids. Levels of PFAS used as replacements, which generally have shorter chains, are on the rise. Examples of biomonitoring studies include:

- A German environmental survey, carried out between 2014 and 2017 on children and adolescents, found PFOS and PFOA in their blood exceeding the human biomonitoring value (the value below which adverse health effects can no longer be excluded). PFOS was found in 100% of the participants and PFOA in 86%^x.
- A Spanish study in 2016 which measured concentrations of PFAS in breast milk, formula milk and baby food found at least two types of PFAS in all samples tested, with some samples containing at least four different types^{xi}. PFAS in breast milk can be directly transferred from mother to child, increasing a newborn child's body burden.
- In 2020, The European Food Standards Agency (EFSA), found PFAS in the blood serum of 99% of people tested, with calculated intake levels for infants and children double that of adults^{xii}. The report concluded that parts of the population would exceed new EU defined tolerable weekly intake limits. Toddlers and children with the highest levels were as a result of exposure in the womb and during breastfeeding.

Many PFAS in use today lack toxicological data, with recent studies reporting they may also be endocrine disrupting, toxic to reproduction, and suspected carcinogens^{xiii}. For example, The International Agency for Research on Cancer classify PFOA, PFOA-related substances and PFOS as suspected carcinogens^{xiv}. Numerous long chain PFAS are immunotoxic, and a recent animal study provides evidence that short-chain PFAS also share this property^{xv}. PFAS remain widespread and pose an immediate threat to the health and wellbeing of UK citizens, biomonitoring studies are urgently needed, and UK REACH must take regulatory action to protect the nation's health.

5. How are we exposed?

The UK public are exposed to PFAS mainly through food and water as well as air, dust, clothes, cosmetics, carpets, electronics and firefighting foams^{xvi}. Exposure also occurs via other routes such as flooring (e.g. polished concrete) and cleaning products. According to EFSA, meat products have the highest levels of PFOS and PFOA. High levels are also present in fish and other seafood^{xvii}. Along with these, dairy products, eggs and contaminated water are the main sources of exposure.

Research by the environmental charity Fidra found PFAS in the packaging of 8 out of 9 major UK supermarkets and 100% of UK takeaways tested^{xviii}. Given regulatory pressure, industry has responded by substituting regulated PFAS with unregulated ones, in particular short-chain PFAS. It is claimed these alternatives are 'safer', however toxicological data is lacking, and studies have shown emerging PFAS such as perfluorohexanoic acid (PFHxA), and perfluoroheptanoic acid (PFHpA) could be as harmful as the ones they replace^{xix}. This unacceptable situation has led to 200 scientists calling on the international community to limit PFAS use and develop safer alternatives^{xxi}.

Whilst individuals can take actions to limit their exposure, it's impossible to avoid exposure to PFAS as there is little information on their use in consumer products and they are ubiquitous in the environment. Environment Minister Rebecca Pow MP, has acknowledged the need for PFAS *to be "addressed as a group, rather than on a substance-by-substance basis"*^{xxxii} with the EU Chemicals Strategy committing to ban their use for all purposes not proven to be essential for society^{xxxiii}. Many scientists have also called for a grouping approach for PFAS^{xxxiv}. It remains the responsibility of the Government and industry to keep harmful chemicals such as PFAS out of our everyday lives.

6. PFAS Links to Breast Cancer

Toxicological (*in vitro* and *in vivo*) and epidemiological studies suggest exposure to low (environmentally relevant) concentrations of several PFAS increase breast cancer risk.

Elevated exposure to natural oestrogen hormones is an established breast cancer risk factor. Women with high levels of endogenous oestrogen have twice the risk of developing the disease, compared to those with average levels^{xxv}. Chemicals which interfere with oestrogen pathways may also affect breast cancer risk. PFAS interfere with several hormonal pathways, including oestrogen, progesterone, androgen and thyroid hormone pathways^{xxvi}. A Chinese study found exposure to several PFAS (measured in cord sera) was associated with higher serum levels of oestrogen in newborn babies^{xxvii}. This could potentially affect their risk of breast cancer later in life.

Animal studies demonstrate early life exposure to PFAS can interfere with normal hormone function, including oestrogen function, which may adversely affect breast development, potentially leading to increased breast cancer risk later in life^{xxviii}. Mouse studies have shown prenatal exposure to PFOA causes significant mammary developmental delays in female offspring^{xxix}. Other studies demonstrate long-chain and short-chain PFAS induce tumours in animals^{xxx}.

In vitro studies have found PFAS have endocrine disrupting properties which affect hormonal pathways. For example, exposures to low levels of PFOA and PFOS were shown to enhance the effects of the natural oestrogen, oestradiol, in breast cancer cells, leading to increased growth and proliferation^{xxxi}. Other studies have found exposure to PFOA and PFOS increases migration and invasion potential in human breast epithelial cells, promotes transformation of normal breast cells and affects pathways associated with anti-cancer activity and tumour suppression^{xxxii xxxiii xxxiv}.

Human epidemiological studies^{xxxv} have found elevated PFAS levels in body fluids are associated with breast cancer^{xxxvi}. One study of French women found those with elevated serum levels of PFOS have an increased risk of oestrogen receptor positive and progesterone receptor positive breast tumours. Low serum concentrations of PFOS and PFOA were associated with increased hormone receptor negative tumours^{xxxvii}. A study carried out in the Philippines found elevated levels of urinary PFAS (PFDoA, PFDA, PFHxA) in breast cancer patients compared to women without cancer. In case-control studies in Greenlandic Inuits, exposures to higher serum concentrations of PFOS and PFOA were associated with breast cancer, and in a follow up study exposure to PFOA, PFOS, PFDA and PFHxA were associated with increased risk^{xxxviii}.

We are exposed to increasing quantities of PFAS, most of which have not been tested for adverse health effects, including their effects on breast development or breast cancer. **To reduce the burden of disease and meet the government commitment to make the 2020s the decade of prevention^{xxxix}, UK REACH must take immediate steps to restrict PFAS for non-essential uses.**

7. Conclusions and Recommendations

To prevent further human exposure to PFAS and pollution of the environment, avoid further regrettable substitution and support the drive for safer alternatives, it is vital the **precautionary principle enshrined within the Environment Act is implemented**^{xi}. Given the irreversible effects of these forever chemicals, action is urgently required to minimise their production and use which **jeopardise public health and increase the chemical burden for future generations**.

Through the UK REACH restriction programme, we have a golden opportunity to lead global action to reduce the impacts of harmful chemicals on human health. This **restriction process for PFAS is a vital test of UK REACH's ability to safeguard public health and support a non-toxic environment**.

We call on the UK Government to:

- **Implement grouping-based legislation for the restriction of PFAS:** A group restriction will support informed substitution towards safer, non-PFAS alternatives and slow the build-up of PFAS in our environment, thereby enhancing public protection.
- **Ban the use of all PFAS in food contact materials:** PFAS' high persistence, endocrine disrupting properties, accumulation potential and known or potential hazards, including their harmful effects *in utero* are sufficient to merit a grouping restriction^{xii}
- **Commit to phase out PFAS for non-essential users:** delivering associated timelines through this restriction proposal, to follow the example of countries such as Denmark^{xiii}.
- **Grant derogations only when use is deemed essential to society and no alternatives are available:** Derogations should be time limited and kept to a minimum with frequent reassessments of availability alternatives conducted to avoid regulatory loopholes.
- **Submit a proposal to the Stockholm Convention for global elimination of all PFAS:** UK Government must lead global action to phase out these chemicals in global supply chains.
- **Introduce a UK Biomonitoring Programme:** DEFRA must deliver a UK biomonitoring programme to monitor the chemical burden in the population with a focus on PFAS.

Breast Cancer UK views a grouping restriction as the only way to ensure a high level of public protection for UK citizens from the irreversible damage caused by PFAS pollution.

See our joint submission with public health and environment Non-governmental organisations [here](#).

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