

# Science for Environment Policy

## Are endocrine disrupting chemicals responsible for downward trends in male fertility?

**A growing body of evidence suggests that endocrine-disrupting compounds (EDCs) are contributing to declines in fertility.** This case-control study found that EDCs were associated with changes to sex hormones and risk of subfertility in men. The researchers say environmental levels of these chemicals should be reduced to protect male fertility.

**Subfertility, the inability to conceive for a prolonged period, is a common problem,** and becoming more so. It has generally been assumed that declining fertility rates are the result of changes to socio-economic and lifestyle factors, such as postponing having children in order to establish a career. However, accumulating evidence suggests increasing exposure to EDCs could also be contributing to downward trends in reproductive health.

**Contaminants** known to have hormone-disrupting properties include phthalates, bisphenol A (BPA), triclosan, and a range of brominated and perfluorinated compounds. These emerging chemicals are present in a growing number of products, from personal care products and clothes to cooking materials and electrical equipment. Yet, even contaminants that are now banned or restricted can continue to affect human health, such as dioxins, PCBs and chlorinated pesticides.

This study aimed to investigate whether exposure to EDCs is associated with subfertility in men (defined as involuntary infertility, meaning that a couple has tried to conceive unsuccessfully for a year or longer). The researchers measured biomarkers of EDC exposure and key fertility parameters in 163 men recruited through four fertility clinics in Belgium. Semen samples were analysed following the [guidelines](#) of the [World Health Organization](#), using a total motility count (TMC) of 20 million as a threshold value for normality.

The researchers recruited 'cases' – male partners of couples who were experiencing involuntary infertility– and 'controls' – male partners of couples with a documented or suspected female cause of infertility, or sperm donors.

Patients were assigned to the case group when two semen samples (collected at least one week apart) had a TMC less than 20 million. If both samples had a TMC of 20 million or above, the patient was assigned to the control group. Of the 163 patients, 80 met the criteria to be controls and 40 to be cases. Blood and urine samples were also taken to analyse levels of EDCs and sex hormones.

The study revealed associations between exposure and subfertility for a number of compounds, including:

- **Chlorinated pesticides** (chlordane and HCB): A 50% increase (from the mean level in the control group) in serum concentration of oxychlordane (the primary metabolite of chlordane) was associated with a 1.98 increased risk of subfertility, a 33% decrease in sperm concentration and a 5% drop in sperm motility. For HCB, an approximate increase of 1.5 in serum concentration was associated with a 28% decrease in sperm concentration.
- **Brominated flame retardants** (BDE209): Detectable levels of BDE209 in serum were associated with a 7.2 increased risk of subfertility and a 33% reduction in sperm motility.
- **Phthalates and triclosan**: Levels of these compounds in urine were associated with the levels of two sex hormones (inhibin B and LH), which may reflect reduced testis function.
- **BPA**: Urinary BPA correlated negatively with testosterone levels.

While serum levels of chlorinated pesticides and BDE209 reflect accumulated exposure in the body, and therefore are likely a sign of past exposure, urinary levels of phthalates, triclosan and BPA reflect more recent exposure, and may provide evidence for changes to fertility during adulthood.

This study shows that concentrations of EDCs in the male body are associated with an increased risk of subfertility, as well as changes to hormone levels, supporting the hypothesis that EDCs are contributing to declining male fertility in the developed world. The authors say their results highlight the importance of reducing the levels of these chemicals in the environment.



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**Contact:**  
[elly.denhond@wiv-isp.be](mailto:elly.denhond@wiv-isp.be)

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