

HEAL policy statement

The opportunity for prevention that should not be missed



EU health savings up to 31 billion per year possible from reducing EDC exposures

The Health and Environment Alliance (HEAL) has commissioned the technical report which follows this policy statement as a first step towards estimating of the costs of a major menace to public health in Europe – the health impacts from exposure to endocrine disrupting chemicals (EDCs).

Over the past 20 years, scientific research has built up a body of evidence linking synthetically-produced EDCs to a wide range of diseases and conditions, including hormone-related cancers, type 2 diabetes, and infertility.

Endocrine disrupting chemicals, or EDCs, are synthetic chemicals used in a range of manufacturing processes, consumer products and agricultural applications to which everyone is exposed in everyday life.



European comparative human biomonitoring has shown mothers and children have several chemicals in their bodies, including EDCs, which are chemicals of concern¹. Other analyses have found dozens of chemicals in human blood.

In an expert report published last year, the World Health Organization (WHO) and United Nations Environment Programme (UNEP) said evidence linking hormone-mimicking chemicals to human health problems had grown stronger over the past decade. It stated that human exposure to EDCs now represented a “global threat” that should be addressed.

¹ <http://www.eu-hbm.info/euresult/media-corner/press-kit>

The calculation

The technical report compiles a cost calculation for a list of diseases and conditions that are related to the human endocrine system. The human endocrine system is essential for healthy functioning of many processes in the body, from prenatal development to most tissue and organ functions in adulthood. Scientists tell us that people’s bodies taking up EDCs (i.e. being exposed) from food, drink and everyday products may be contributing to the number of cases of these diseases.

The conditions include:

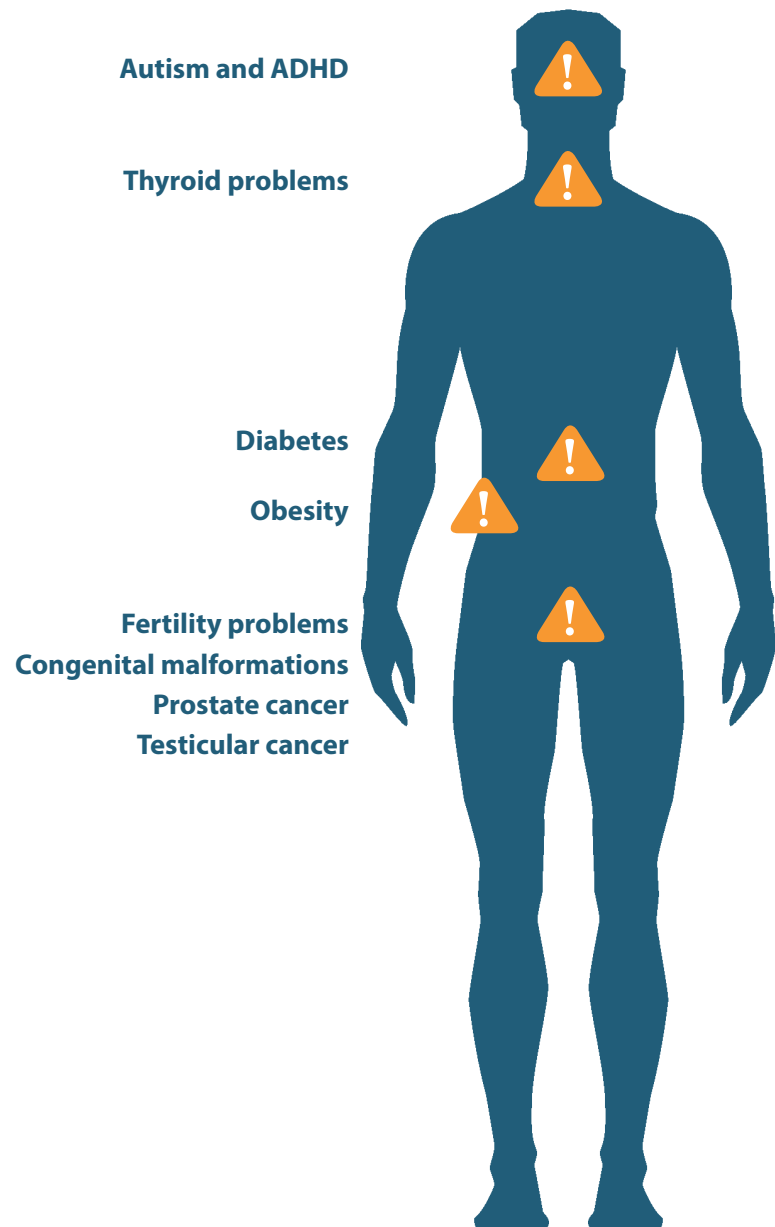
- Reproductive and fertility problems
- Abnormalities of the penis and testicles in baby boys
- Cancer of the breast, prostate, testes
- Children’s behavioural disorders, such as autism and attention deficit hyperactivity disorder (ADHD)
- Obesity and diabetes.

University of Bath environmental economist, Dr Alistair Hunt, and Dr Julia Ferguson, Visiting Fellow at the Cranfield School of Management have produced an estimate of total costs in the European Union (EU) based on cost figures available for the above conditions. Their technical report puts the total of costs for the selected endocrine-related diseases and conditions at €636 – 637.1 billion per year in the EU.

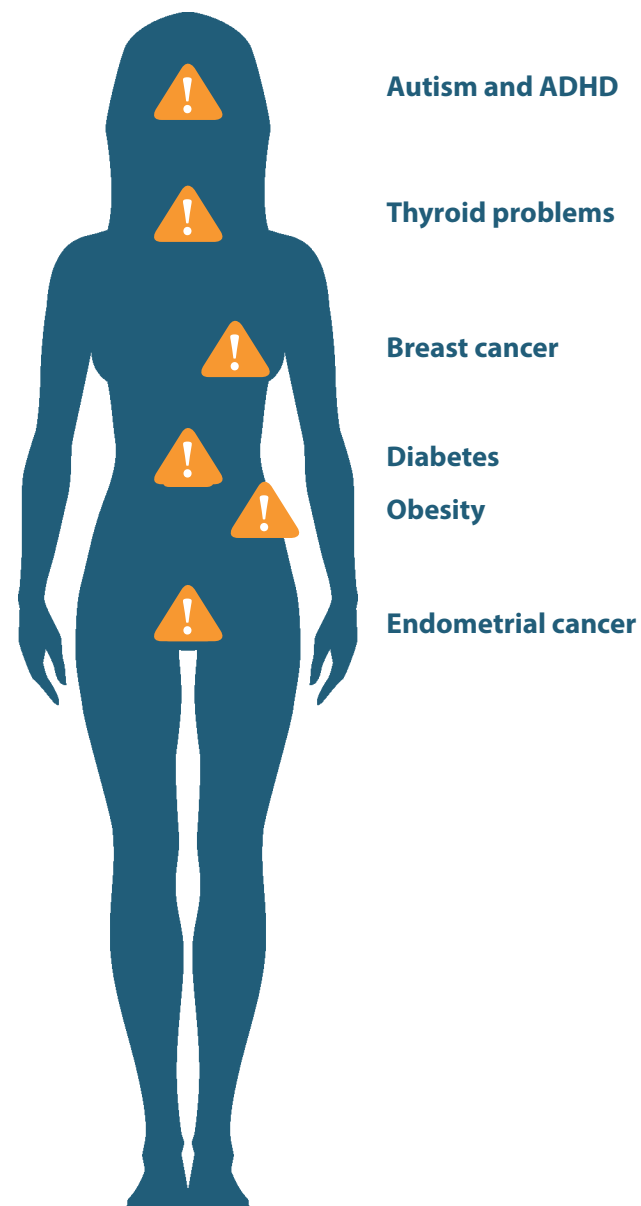
It is worth noting that the total cost calculation is probably a gross underestimate despite some of the assumptions and generalisations involved in calculating it.

- Figures were not available for all the endocrine-related health problems.
- Some figures are estimates for costs to the health care system but do not include the costs to families arising from illness and to employers from lost working days.
- None of the figures cover the costs of misery and pain associated with these conditions.

The Endocrine System: Health problems for men related to EDCs?



The Endocrine System: Health problems for women related to EDCs?



Linking the costs to exposure

Only a proportion of this total cost figure can be attributed to EDC exposure since major contributors to these diseases include genetics and lifestyle factors, such as diet, smoking or insufficient physical activity.

No-one knows exactly what contribution EDC exposure makes to the overall costs of the chronic diseases and health problems covered. A pioneering US scientific paper estimated the contribution of exposure of a single EDC to two different health conditions. Scientists found that BPA exposure in food contact materials may be responsible for 1.8% or 12,000 cases of child obesity and almost 39,000 cases of new incident coronary heart disease in the USA, with associated costs of US\$2.98 billion.

The above paper is limited to one EDC and two conditions and applies only to food contact materials. In reality, humans of all ages are exposed to many EDCs via many different exposure pathways – one source lists nearly 1,000 potential EDCs². Moreover many diseases and conditions have been identified as potential consequences of that exposure (hormonal cancers, reproductive problems, metabolic diseases, neuro-behavioral disorders). In addition, the WHO has noted that the 'environmental burden of disease' from chemicals is likely to be underestimated because of lack of data³.

It therefore seems possible that 2-5% would be a more realistic proportion. Whilst this percentage is a speculation, in the absence of more scientific work on what proportion of diseases could be attributed to EDC exposure, the hypothetical 2-5% figure can be instructive for policy makers considering the potential benefits accruing from reducing exposure and preventing diseases.

² See the Endocrine Disruption Exchange (TEDX) List of Potential Endocrine Disruptors: <http://endocrinedisruption.org/endocrine-disruption/tedx-list-of-potential-endocrine-disruptors/overview>

³ "Knowns and unknowns on burden of disease due to chemicals: a systematic review", Prüss-Ustün et al, Environmental Health 2011, 10:9. <http://www.ehjournal.net/content/10/1/9>

If EDCs contribute to only 2-5% of the total health costs from endocrine-related chronic diseases, EU policy change such as the phasing out of these hazardous substances and promoting safer alternatives could save Europeans up to €31 billion each year in health costs and lost productivity.

Here, there are also factors that could make these figures of between 13 and 31 billion an underestimate. For example, future costs are likely to be even higher than today's because:

- Current exposure may not appear as cancer or diabetes until decades later.
- Certain EDC-related conditions imply future health risks. For example, a baby boy born with a genital defect known as hypospadias has a higher risk of becoming infertile or developing testicular cancer later in life.
- Trans-generational, or epigenetic, effects may occur. This means that future generations may be affected by damage caused by EDC exposure in the current generation.

What are endocrine disrupting chemicals?

The following endocrine disrupting chemicals (EDCs) are all related to familiar objects in our daily lives. They are present in the environment and in our bodily fluids, such as urine, blood, the umbilical cord and breast milk.

Bisphenol A (BPA): a constituent part of polycarbonate plastic and epoxy resins. Polycarbonate is found in hundreds of everyday objects, such as eye glasses, computer casing and plastic food containers and dishes from which BPA can leach into food. Epoxy resins are used as a food preservative, as internal coatings inside tins, jars and lids, in water supply pipes and wine vats. There are other uses such as the thermal paper receipts from supermarkets. Researchers associate BPA exposure with breast and prostate cancer, metabolic disorders (diabetes, obesity), cardiovascular risk, problems with reproduction and neuro-behavioural problems.

Certain phthalates: plasticising additives principally found in flexible polyvinylchloride (PVC) (used in flooring, medical tubing for drips, shoes and gadgets), texturing agents, solvents and fixatives, fragrances in cosmetics and perfumes. Some phthalates, e.g. DEHP, DBP, and BBP are classified in Europe as toxic to reproduction, and have the potential to exert endocrine disruption, which may cause birth defects, harm to reproduction, organ damage, obesity, early puberty or cancer of the breast or testis.

Parabens: propyl and butyl paraben are preservatives used in personal care products or as food additives. Propylparaben has estrogenic and anti-androgenic properties and has been shown to decrease the production of sperm in male rats. Butylparaben shows a stronger estrogenic activity than propylparaben and also has effects on thyroid hormones; it affects the number and mobility of sperms and the metabolism of fats.

Perfluorinated chemicals (PFOA, PFOS): a family of halogenated polymers used in non-stick cookware (e.g. frying pans); textiles and products which have been treated to resist stains; packaging; and cosmetics. A Danish study published in 2009 links them to the decrease in sperm count in men.

Perchloroethylene: the chlorinated solvent often used in dry cleaning. Classified as a probable carcinogen (CMR 2A) by the World Health Organization's specialist cancer agency (IARC), exposure among pregnant mice affects the weight of the uterus and the fetus, and alters the behaviour of male offspring. In humans, an epidemiological investigation suggested links between occupational exposure and neurological disorders.

Ultraviolet (UV) filters: several common ultra-violet filters used in sun-tan products and other cosmetics, such as oxybenzone (also known as benzophenone) compounds and derivatives of camphor, can cause endocrine disruption and affect the reproduction of the offspring of exposed male rats.

Butylated hydroxyanisole (BHA): this antioxidant and preservative is commonly used in food, for example, chewing gum, and in food packaging and cosmetics. Rats fed with BHA are found to have lower levels of hormones (testosterone and thyroid hormones) and sperm abnormalities. Their offspring are smaller, have delayed sexual maturation, and smaller than normal reproductive organs.

Brominated flame retardants (BFRs): a family of compounds used as flame retardants in electronic components, plastics and synthetic textiles. Some are proven to disrupt thyroid hormones in mammals.

Heavy metals: such as mercury which is still used in dental fillings. According to researchers, the endocrine disturbance would affect the ovaries and testicles provoking immune disorders, reproductive disorders and an increase in breast cancer.

Certain pesticides: Many agricultural pesticides are suspected endocrine disruptors, which can be ingested as residues from processing fruits and vegetables. They include thiram, methoxychlor, mancozeb, zineb, fenarimol, resmethrin, deltamethrin, metribuzin, ketoconazol, carbaryl, terbutyn, fenitrothion, and chlorpyrifos.

Where to find out more about which chemicals are EDCs

European Union Institutions and Agencies:

- EU Joint Research Centre Database on EDCs⁴: http://ihcp.jrc.ec.europa.eu/our_activities/food-cons-prod/endocrine_disrupters/eas_database
- European Chemicals Agency REACH Candidate List⁵: <http://echa.europa.eu/candidate-list-table>

Member State Governments:

- Sweden's list of pesticides⁶: http://www.kemi.se/Documents/Bekampningsmedel/Docs_eng/SE_positionpapper_annenll_sep08.pdf

Public Interest / Non Profit Organisations:

- SIN (Substitute It Now!) List by the International Chemical Secretariat (ChemSec)⁷: <http://www.chemsec.org/what-we-do/sin-list>
- TEDX (The Endocrine Disruption Exchange) list of potential EDCs⁸: <http://endocrinedisruption.org/endocrine-disruption/tedx-list-of-potential-endocrine-disruptors/overview>
- Pesticide Action Network Europe: <http://www.disruptingfood.info/en/consumer-guide>

⁴ 428 substances suspected of endocrine disruption, and more will be added in an update

⁵ as of June 2014, 4 EDCs listed due their EDC properties, and more listed for their reproductive toxicity

⁶ both EDCs and other hazardous properties (carcinogens, mutagens and reproductive toxicants)

⁷ as of June 2014, 47 substances not including substances classified for reproductive toxicity

⁸ As of June 2014, nearly 1,000 substances

Understanding EDCs

While it was long accepted that “the dose makes the poison” (meaning that the concentration of the chemical determines the severity of its effect), EDCs have the five following characteristics that contradict the simplicity of this traditional dictum:

- Low doses may be more harmful than higher doses in certain circumstances
- Critical windows of exposure exist (e.g., exposure may be more harmful during phases of sensitive, rapid development such as the fetal period, puberty and pregnancy)
- The combined effects of several EDCs working together maybe greater than would result from the individual EDCs acting alone (mixtures or the “cocktail” effect)
- The “poison” can be latent rather than immediate (e.g., exposure in utero may increase risk of breast cancer later in life)
- Effects from exposure of the current generation may be carried on to the next and later generations in trans-generational, or epigenetic, effects.

Existing regulation

The manufacture and use of chemicals has increased enormously over the past 40 years, and the levels in our bodies likewise. The “chemicalisation” of our lives has prompted increased scrutiny by policy-makers and regulatory bodies of the potential hazards of certain substances, including some limited regulatory action on EDCs.

The EU has in the past and can still cite the precautionary principle as a rationale for protecting human health or the environment when the existing evidence of harm is worrying but not absolutely conclusive. For example, the use of certain phthalates in soft PVC toys and child care articles, which are intended to be placed in the mouth by children under three years of age, have been banned since 1999. In 2009, the law was revised to include more substances. EU law has prohibited Bisphenol A (BPA) in plastic feeding bottles for babies since 2011.

Some EU countries like Austria, Belgium, Denmark, France and Sweden have taken further action nationally, for example on BPA in food contact materials, or on other substances. Some countries are also very active in promoting regulatory action on EDCs at EU level. For example, France has proposed the restriction of BPA in thermal paper (e.g., in cash receipts) under the EU REACH chemicals law.

However, many known and suspected EDCs remain in food, drink, food contact materials, body care products, furniture, electronics, carpets and many other products. They are released into air, onto our skins, and move into our bodies in other ways allowing interaction with our hormone systems repeatedly in our daily lives.

Regulatory action by the EU could be effective in reducing human exposures in a relatively short period of time. Even though some EDCs are “persistent”, that is, they stay lodged in the environment and our bodies for a long time, monitoring shows that levels fall after a ban. For example, traces of DDT in breast milk in Europe have declined in the years since the ban.

Where regulatory action to protect or improve health has been taken in the past - even if there was not 100% scientific proof of harm - hindsight and further science has shown it to be justified⁹. Examples include early controls on smoking, which were introduced before scientists were able to show a biological explanation of the causal link.

What should be done now?

The leading scientists on endocrine disruption have made clear that enough evidence now exists to justify acting to protect human health and the environment.

HEAL is working hard to achieve the following changes as soon as possible. In this effort, HEAL is joined by many concerned groups and individuals, including more than 50 partner organisations of the EDC-Free Europe alliance.

⁹ Late Lessons from early warnings, 2013, EEA, <http://www.eea.europa.eu/publications/late-lessons-2>

- Swiftly establish official European methods for identifying and categorising EDCs across all uses
- Overhaul all relevant, existing EU laws to reduce exposure to EDCs
- Set out a timetable by which EDCs must be identified, the tests to identify them made mandatory, and safer alternatives phased in
- Reform risk assessment processes to ensure the characteristics of EDCs are fully taken into account and reflected in final assessments and risk management decisions
- Promote safer alternatives and thereby stimulate safer, greener innovation
- Include the phasing out of EDCs in national plans to tackle chronic diseases and other disease prevention efforts
- Educate health professionals, medical experts and health affected groups so they can better assist their patients/members in exposure reduction, conduct clinical research, and participate in relevant policy making fora.

Reducing exposure could bring huge health benefits

As an alliance of over 65 member organisations, representing health professionals, not-for-profit health insurers, doctors, nurses, cancer and asthma groups, citizens, women’s groups, youth groups, environmental NGOs, scientists and public health research institutes, HEAL advocates for urgent policy and regulatory action to swiftly reduce exposure, particularly for the most vulnerable like women before and during pregnancy, infants and children.

Taking action now rather than later could help reduce the spiralling rates of certain hormone-related conditions. It would also offer huge financial benefits alongside the avoided pain and suffering.