Chain of Contamination

The Food Link

September 2006

Summary

This report is the culmination of WWF's 10 years of work on the toxics issue. WWF has published numerous reports on the nature and extent of chemical contamination of wildlife and humans. Following on from those studies we present here new data on the chemical contamination of food, the most important route of human exposure for many persistent, bioaccumulative and endocrine disrupting chemicals. The results are placed in a broader context – that of a global chain of contamination where industrial chemicals and those designed for use in everyday products find their way into the environment, food, wildlife and humans.
This global chain of contamination is the perfect illustration of why REACH (Registration, Evaluation and Authorisation of Chemicals), the currently debated European chemicals legislation, needs to be strengthened to effectively protect humans and wildlife.

Important note:
The analysis reported here is intended to provide a snapshot of the broad selection of man-made chemicals that can be found in everyday food items and therefore the kinds of chemical contaminants people can consume as part of a normal diet. It is not a comprehensive food survey aimed at determining dietary intakes or evaluating the risk of eating certain foods. Food authorities in European countries conduct comprehensive surveys of chemical contaminants in a wide range of foods, and publish information on health risks and consumption guidelines. For example, the UK Food Standards Agency has recently published reports on brominated and fluorinated chemicals in UK diet samples and dioxins and PCBs in fish and shellfish[1]. Independent researchers also investigate contaminants in food. For example, recent studies have investigated brominated flame retardants[2] and nonylphenols[3] in food. WWF is of the opinion that chronic, low level exposure to a combination of chemical contaminants via the diet and other exposure routes has not been given sufficient considerstion in past decision making on chemicals. WWF is therefore lobbying to ensure the EU's proposed REACH legislation is sustainably strengthened, as it offers a once in a lifetime opportunity to tackle the problem of food chain contamination by driving the substitution of persistent, bioaccumulative and endocrine disrupting chemicals with safer alternatives.

1 http://www.food.gov.uk/science/surveillance
2 Schecter A, Papke O, Tung KC, Staskal D, Birnbaum L. (2004). Polybrominated diphenyl ethers contamination of United States food. Environ Sci Technol., 38(20), pp5306-11.
3 Guenther K, Heinke V, Thiele B, Kleist E, Prast H, Raecker T. (2002). Endocrine disrupting nonylphenols are ubiquitous in food. Environ Sci Technol., 36(8), pp1676-80.

Introduction

Man-made chemicals are an integral and vital part of our modern lifestyles. They are found in a vast range of consumer products – from furniture, clothing and toiletries to electrical appliances, car interiors and cleaning products. While they have undoubtedly improved the quality of our lives, many possess undesirable properties. They can be harmful to health and many can persist[4] in the environment and bioaccumulate[5] in the bodies of wildlife and people.

These properties have resulted in ecosystems all over the world being contaminated with a cocktail of man-made chemicals. Examples include the chemicals DDT (an insecticide) and PCBs (polychlorinated biphenyls - used in electrical components), which despite having been banned for decades, are still found throughout the global environment.

In more recent years, modern chemical compounds such as brominated flame retardants (used to prevent fire in plastics e.g. TVs, computers and textiles e.g. furniture, carpets) and perfluorinated “non-stick” chemicals, (used for waterproof and stainproof coatings) have followed PCBs and DDT to all corners of the globe. Some chemicals can also interfere with hormone processes in the body – these are known as “endocrine disrupting” chemicals (EDCs). Examples include phthalates, primarily used to soften plastics and found in numerous consumer products, from vinyl flooring to cosmetics.

There is a large body of scientific evidence on the adverse impacts of man-made chemicals on wildlife species e.g. population crashes in birds of prey caused by DDT, immune impacts of PCBs on seals. Research, including WWF’s own biomonitoring studies[6] has also consistently shown that humans all over the globe are exposed to a cocktail of potentially hazardous chemicals including DDT and PCBs, as well as brominated flame retardants, perfluorinated chemicals, artificial musks (used as synthetic fragrances in many consumer products) and phthalates.

Many of these chemicals have been detected in young children as well as adults, and in some cases at higher levels in children than in adults. Alongside this, there is growing concern over possible links between certain chemicals (particularly endocrine disrupting chemicals) and human health impacts such as cancer, reproductive problems, birth defects, asthma, allergies, behavioural problems, disruption of infant brain development, cardiovascular disease, diabetes and obesity.

4 Persistent refers to chemicals that are not readily broken down and therefore persist in the environment for long periods of time (months, years, decades).
5 Bioaccumulative – Refers to persistent chemicals that build up and reach high levels in the bodies (blood, breast milk, organs, tissues) of humans and wildlife species. Many such chemicals bind to fat in particular.
6 WWF-UK (2003). ContamiNATION, the results of WWF’s biomonitoring survey ; WWF-UK (2004). Contamination: the next generation http://www.wwf.org.uk/chemicals/publications.asp; WWF (2005) Generations X http://detox.panda.org/news_publications/publications_detail.cfm?uxNewsID=25616

How are humans and wildlife exposed?

Chemicals contaminants may reach the environment as a result of direct discharges from industrial processes, inappropriate disposal of waste and "leaching" from waste and landfill sites. Direct application (e.g. old organochlorine pesticides) and spillages or leakages during manufacture, transport or storage are also important inputs to the environment. Chemicals can also escape into the environment during their incorporation into consumer products or from products as they are used and wear out. For example, the air and dust in our homes, schools and offices can contain chemicals such as flame retardants, phthalates and PCBs that have escaped from furniture, flooring, building materials and electrical appliances.

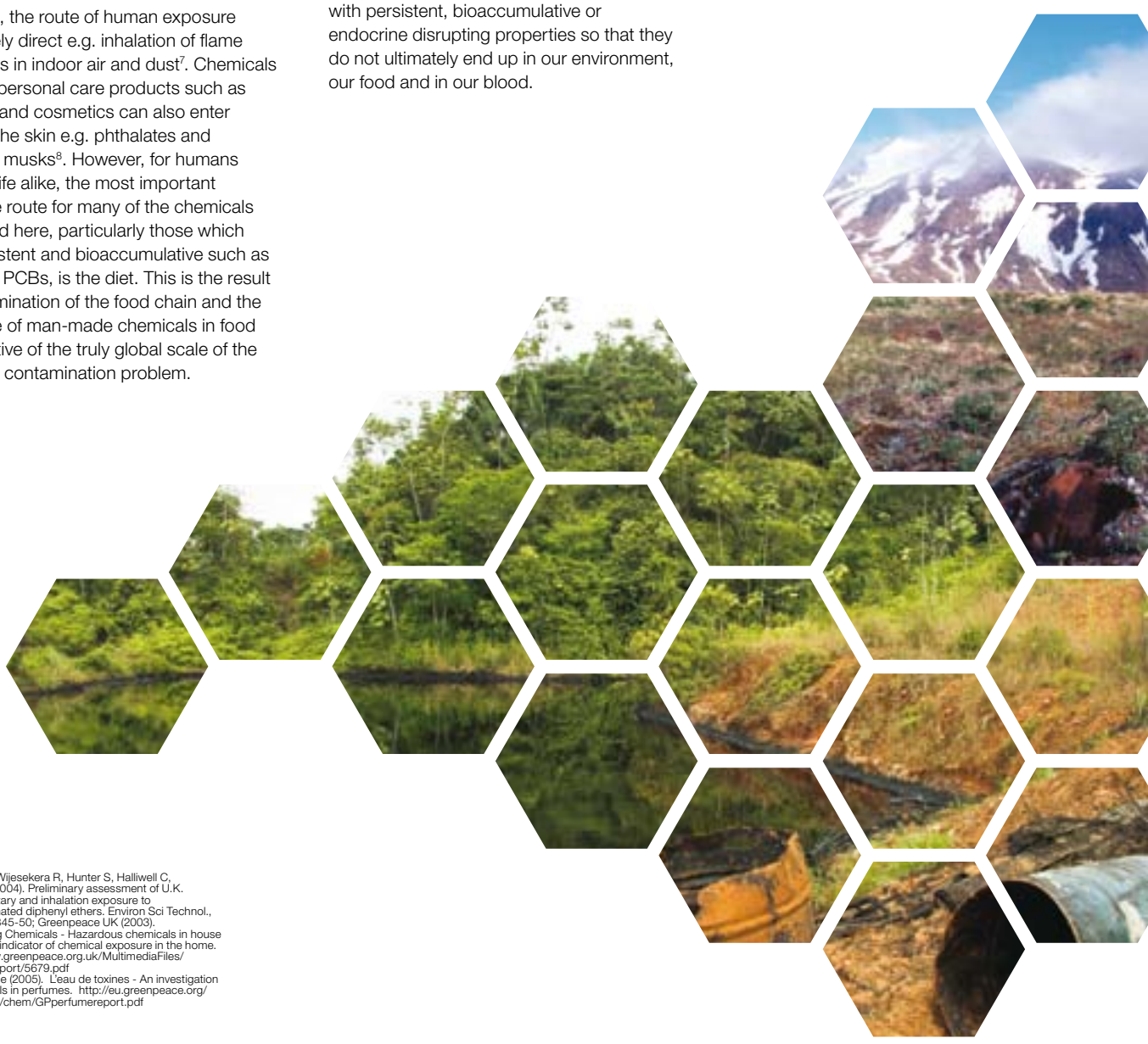
For some chemicals used in consumer products, the route of human exposure is relatively direct e.g. inhalation of flame retardants in indoor air and dust[7]. Chemicals found in personal care products such as toiletries and cosmetics can also enter through the skin e.g. phthalates and synthetic musks[8]. However, for humans and wildlife alike, the most important exposure route for many of the chemicals discussed here, particularly those which are persistent and bioaccumulative such as DDT and PCBs, is the diet. This is the result of contamination of the food chain and the presence of man-made chemicals in food is illustrative of the truly global scale of the chemical contamination problem.

Food is a crucial link in a chain of events that begins with the manufacture of chemicals and ends with their unwelcome appearance in the blood supply of developing foetuses and the blood and tissues of children, adults and wildlife species. Therefore, presented here is the culmination of WWF's 10 years of work on the issue of hazardous chemicals – an investigation of the food link within this global "chain of contamination".

In investigating the contamination of food, the importance of the EU's proposed REACH chemicals legislation becomes even clearer. If suitably strengthened at second reading, REACH will provide a mechanism to phase out the most harmful chemicals and replace them with safer alternatives wherever possible. REACH provides a unique opportunity to properly control chemicals with persistent, bioaccumulative or endocrine disrupting properties so that they do not ultimately end up in our environment, our food and in our blood.

"We can no longer ignore the proof that chemicals are damaging the health of Arctic wildlife. DDT and PCBs, but also new contaminants – brominated flame retardants and fluorinated chemicals – are being found in the bodies of Arctic Peoples. Chemical contamination forces us to prepare our traditional food differently and in some cases avoid eating the most contaminated parts of the animals."

Pavel Sulyandziga, Vice-President of RAIPON, Russian Association of Indigenous Peoples of the North.



7 Harrad S, Wijesekera R, Hunter S, Halliwell C, Baker R. (2004). Preliminary assessment of U.K. human dietary and inhalation exposure to polybrominated diphenyl ethers. Environ Sci Technol., 38(8), pp2345-50; Greenpeace UK (2003). Consuming Chemicals - Hazardous chemicals in house dust as an indicator of chemical exposure in the home. http://www.greenpeace.org.uk/MultimediaFiles/Live/FullReport/5679.pdf

8 Greenpeace (2005). L'eau de toxines - An investigation of chemicals in perfumes. http://eu.greenpeace.org/downloads/chem/GPperfumereport.pdf

Contamination of the food chain

Food represents a part of the global environment which can be contaminated by chemicals from many different sources. Following their release into the environment (soil, sediment, water, air) chemical contaminants can enter plants and animals at the bottom of the food chain which are then consumed by animals higher up. The chemicals contained in these animals and plants can enter our own bodies when we consume them as food e.g. meat, dairy products, fish, vegetables, fruit.

This “food chain” route of contamination is especially important for chemicals that persist and accumulate in the environment, such as DDT, PCBs and brominated flame retardants[9]. It is also relevant for chemicals that are used in large amounts and occur ubiquitously in the environment e.g. phthalates. Packaging and processing may also introduce chemicals into food e.g. perfluorinated chemicals used in greaseproof packaging for fast foods. It is for these reasons that WWF’s focus now shifts to investigating contaminants in food, and in the process presents the next logical step on from its human biomonitoring work.

Analysis of food items

In this study, WWF commissioned a preliminary analysis of man-made chemical contaminants in a wide range of food items (n = 27) selected from seven EU countries. Food items (one sample of each), were purchased in supermarkets in Finland, Greece, Italy, Poland, Spain, Sweden and the UK and sent to a laboratory for analysis (TNO, Netherlands). The chemicals analysed included many of those found in WWF’s biomonitoring studies (e.g. PCBs, DDT, brominated flame retardants, perfluorinated chemicals, phthalates, artificial musks) as well as those found in other biomonitoring and indoor air/dust studies (organotins, alkylphenols).

9 Schecter A, Papke O, Tung KC, Staskal D, Birnbaum L. (2004). Polybrominated diphenyl ethers contamination of United States food. Environ Sci Technol., 38(20), pp5306-11.

"The results show that many of these compounds are present in food in a concentration range of 0.1 to 10 ng/g with the exception of phthalates for which typical concentrations are two orders of magnitude higher".

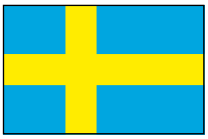
(TNO technical report).

The different chemicals analysed in each food item can be found in table 1. While some of the chemicals can be found in food packaging, WWF's focus was on those chemicals that get into food primarily due to contamination of the environment and subsequently, the global food chain. They are not necessarily those most commonly associated with food, such as modern pesticides and artificial additives. They are chemicals that have entered the environment due to man's past and present use of consumer products and synthetic agricultural and industrial chemicals.

The Food Items were:


UK:
Butter, cheddar cheese, bacon, sausages, eggs, milk, olive oil, chicken breast, fish fingers, Scottish smoked salmon, tuna (tinned), honey, brown bread, orange juice, Scottish cheddar cheese.


Finland:
Frankfurters, reindeer meat.

Sweden:
Pickled herring ("strömming"), minced beef ("köttfärs").


Poland:
Pork chop ("schabowy"), cottage cheese ("serek wiejski").


Italy:
Salami ("Salame Caccioatore"), Caciotta cheese.


Spain:
Ham ("jamon curado"), Manchego cheese.


Greece:
Pork steak, Kefalotyri cheese.

What was found?

Chemical contaminants were found in all food items (see table 1). Many of the same chemicals have also been found in wildlife and people during WWF's biomonitoring studies, highlighting the importance of the diet as a route of exposure. For a detailed breakdown of the different chemicals found in each food item, refer to the technical report prepared by TNO analytical laboratory (wwf.org.uk/chemicals/publications.asp). All contaminants detected are expressed in nanograms per gram of wet weight of the food item (ng/g wet weight). A nanogram is a billionth of a gram.

Results of WWF analysis of European food items

(for further information on the chemicals, please refer to the factsheets – wwf.org.uk/chemicals/publications.asp

Table 1

Chemical group	Background	Analysed in	Results
12 organochlorine (OCPs) pesticides incl. DDT, HCB, lindane, chlordane	Used for agricultural and public health control of insect pests. Banned in Europe, some banned globally. Highly persistent and bioaccumulative and shown to cause long-term toxic effects in wildlife.	All food items.	Frequently detected in a variety of food items, including fish, cheese, smoked salmon, butter and meats. Levels relatively low in comparison to a recent FDA survey from the US[10]. p,p' DDE, a metabolite of DDT, detected in 16 out of 27 food items – higher levels detected in fish (pickled herring, smoked salmon) and cheese (manchego, kefalotyri, cottage cheese). Highest level found in pickled herring.p, p' DDE and o, p' DDE also detected in orange juice. The highest total level of OCPs was found in pickled herring, followed by orange juice.
44 polychlorinated biphenyls (PCBs)	Used as coolants and lubricants in transformers, capacitors, and other electrical equipment. Globally banned. Highly persistent and bioaccumulative. Some shown to adversely affect neurological development.	All food items except orange juice.	Found in all analysed food items to varying degrees, even butter, honey & brown bread. Highest levels found in fish (smoked salmon and pickled herring). Results are comparable with those reported by EFSA (European Food Safety Authority) for European foods[11].
33 brominated flame retardants (BFRs) incl. 31 polybrominated diphenyl ethers (PBDEs) + HBCD and TBBP-A	Used to flame retard plastics, textiles, and other materials in furniture, carpets, electronic appliances (TVs, computers) etc. Persistent and bioaccumulative. Some banned, some still in use. Some associated with behavioural changes and adverse effects on neurological development in animals.	All food items except orange juice.	Found in 19 of the 26 analysed items - primarily in meats, cheeses and fish, also in foods such as brown bread, butter and honey. In contrast to other studies, highest concentrations were found not in fish, but in meat and certain cheeses - highest total PBDE level found in minced beef, second highest in Scottish cheddar cheese. PBDEs detected in tuna and pickled herring, but not in smoked salmon. Concentrations comparable with other studies[12], lower than US study[13], generally higher than 2006 UK FSA study[14].
8 perfluorinated chemicals (PFCs) incl. PFOS and PFOA.	Used in manufacture of non-stick coatings, fast food packaging, greaseproof and waterproof treatments. Highly bioaccumulative. Linked to liver damage and increased risk of bladder cancer. EU restrictions under development.	Fish fingers, smoked salmon, tuna, pickled herring, brown bread.	PFOS and PFOSA detected only in pickled herring, within the range found in a previous study[15]. PFOS detected at higher levels than PFOSA. PFOS detected at comparable levels as in UK FSA total diet samples, but in different foods (not fish)[16]. Similar levels detected in seafood from China[17].
8 phthalates incl DEHP, DBP, BBP	Used to make plastics flexible (particularly PVC) and in toiletries and cosmetics. Concerns over endocrine disrupting properties. Linked to negative effects on male sexual development (birth defects, testicular cancer, low sperm counts). Some phthalates restricted in EU, some not.	All food items except fish fingers, smoked salmon, tuna, honey, brown bread, pickled herring.	Found in 16 of the 21 items analysed – predominantly in meat (e.g. chicken, ham – jamon curado) and dairy products (butter and particularly cheeses – cottage cheese, caciotta, manchego). DBP, BBP and particularly DEHP, most frequently detected phthalates. Highest level of DEHP (and total phthalates) found in olive oil. Second highest total level of phthalates in manchego cheese. Levels similar to those reported in foods by the UK FSA[18].
4 artificial musks AHTN and HHCB, musk xylene (MX), musk ketone (MK)	Fragrance chemicals used in toiletries, cleaning products, air fresheners, cosmetics. Persistent and bioaccumulative. Suspected endocrine disruptors. Use of MX/MK now significantly reduced in EU.	Fish fingers, smoked salmon, tuna, pickled herring.	AHTN and HHCB found in tuna, pickled herring with higher levels in herring. Levels lower than those previously reported in other studies[19].
Alkylphenols isomers of nonylphenol (NP) and octylphenol (OP)	Used in detergents, and other applications. Many uses of nonylphenol now banned in the EU, but octylphenol still in use. NP is moderately persistent in aquatic environments. Endocrine disrupting properties, linked to feminisation ("gender-bending") effects in fish.	All food items except fish fingers, smoked salmon, tuna, honey, brown bread, pickled herring.	Nonylphenol isomers were detected in butter and bacon at levels comparable to a comprehensive 2002 study[20].
5 organotins incl TBT (tributyltin)	Used as biocides, wood preservatives, marine antifoulants. Persistent and bioaccumulative, endocrine disrupting. TBT caused population crashes in marine invertebrates due to endocrine disrupting effects. Global ban agreed for TBT in ship paints and being implemented in EU.	Fish fingers, smoked salmon, tuna, pickled herring.	Organotins detected in fish fingers, tuna and pickled herring. Highest levels in tuna. Levels comparable to a recent EFSA study[21].

10 Food and Drug Administration (FDA) Total Diet Study 1999 - http://vm.cfsan.fda.gov/~acrobat/pes99rep.pdf; FDA Total Diet Study 2003, http://www.cfsan.fda.gov/~comm/tds-toc.html
11 B. Gallani, A. Boix, A. Di Domenico and R. Fanelli. (2004). Occurence of NDL-PCB in food and feed in Europe. Organohalogen Compounds Vol. 66.
12 Bocio A, Llobet JM, Domingo JL, Corbella J, Teixido A, Casa C.J. (2003). Agric Food Chem. 51, pp3191-3195; Ohta S, Ishizuka d, Nishimura H, Teruyuki N, Aozasa O, Shimidzu Y, Ochiai F, Kida T, Nishi M, Miyata H. (2002). Chemosphere, 46, pp689-696
13 Schecter A, Papke O, Tung KC, Staskal D, Birnbaum L. (2004). Polybrominated diphenyl ethers contamination of United States food. Environ Sci Technol., 38(20), pp5306-11.
14 Food Standards Agency UK (June 2006) Brominated chemicals: UK dietary intakes. www.food.gov.uk/science/surveillance
15 Multi-City Study of the 3M-company (2001). Centre Analytical Laboratory, study number 023-057: Analysis of PFOS, FOSA and PFOA from various food matrices using HPLC electronspray/mass spectrometry.
16 Food Standards Agency UK (June 2006) Fluorinated chemicals: UK dietary intakes www.food.gov.uk/science/surveillance
17 Gulkowska A, Jiang Q, So MK, Taniyasu S, Lam PK, Yamashita N. (2006). Persistent perfluorinated acids in seafood collected from two cities of China. Environ Sci Technol., 40(12), pp3736-41.
18 MAFF - Joint Food Safety and Standards Group (1996). Food surveillance information sheet. MAFF UK Phthalates in food. Number 82, March 1996.
19 Gatermann R, Biselli S, Huhnerfuss H, Rimkus GG, Hecker M, Karbe L. (2002). Arch Environ Contam Toxicol, 42, pp437-446; Fromme H, Otto T, Pilz K. (2001). Food Addit Contam., 11, pp937-944.
20 Guenther K, Heinke V, Thiele B, Kleist E, Prast H, Raecker T. (2002). Endocrine disrupting nonylphenols are ubiquitous in food. Environ Sci Technol., 36(8), pp1676-80.
21 European Commission (October 2003). Report on Tasks for Scientific Cooperation (SCOOP), task 3.2.13. Assessment of the dietary exposure to organotin compounds of the population of the EU member states. European Commission, Directorate-General Health and Consumer Protection.

Highest and lowest

The table below shows the range in concentrations of various chemicals detected in the food items. As only one sample of each food item was analysed, these results are not representative of each country's food. They are however indicative of the contamination of the food chain by man-made chemicals and are a perfect illustration of why an effective system for controlling chemicals is so important and long overdue. Decades of inadequate regulation have led to the lamentable situation of global contamination, where even the food we eat is tainted and exposure continues generation after generation.

Table 2 - Range of chemical concentrations detected in food items.

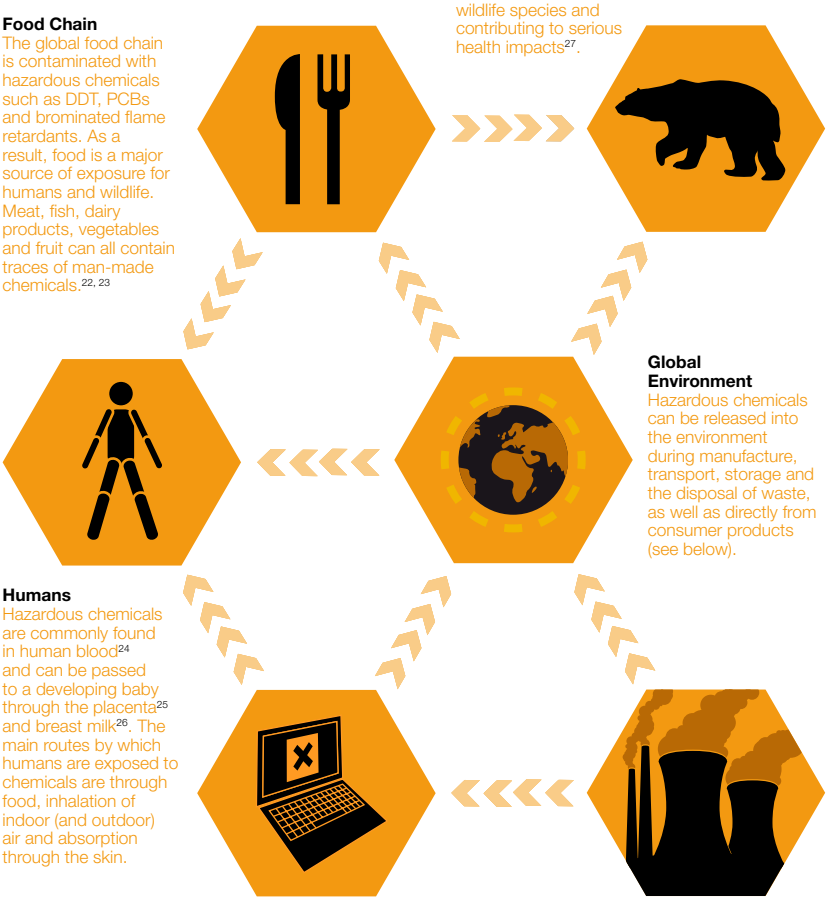
Chemical	Found in	Lowest	Highest	2nd highest
HCB	16 out of 27 analysed	0.1 ng/g (sausages, olive oil, frankfurters, cottage cheese, salami, jamon curado)	0.83 ng/g (reindeer meat)	0.7 ng/g (pickled herring)
p, p' DDE	16 out of 27 analysed	0.17 ng/g (pork chop, jamon curado)	5.6 ng/g (pickled herring)	1.6 ng/g (Manchego cheese)
Total PCBs	26 out of 26	0.16 ng/g (eggs)	31.0 ng/g (pickled herring)	6.9 ng/g (smoked salmon)
Total PBDEs	19 out of 26 analysed	0.15 ng/g (honey)	1.3 ng/g (minced beef)	1.15 ng/g (Scottish cheddar)
DEHP	16 out of 21 analysed	20 ng/g (frankfurters)	24 000 ng/g (olive oil)	3300 ng/g (jamon curado)
DBP	9 out of 21 analysed	76 ng/g (Cacioatta cheese)	780 ng/g (cottage cheese)	760 ng/g (chicken)
BBP	12 out of 21 analysed	2 ng/g (bacon)	340 ng/g (olive oil)	50 ng/g (Manchego cheese)
AHTN (musk)	2 out of 4 analysed	0.18 ng/g (tuna)	0.29 ng/g (pickled herring)	-
HHCB (musk)	2 out of 4 analysed	0.27 ng/g (tuna)	0.56 ng/g (pickled herring)	-
MBT (organotin)	2 out of 4 analysed	0.5 ng/g (fish fingers)	9.0 ng/g (tuna)	-
DBT (organotin)	2 out of 4 analysed	0.6 ng/g (pickled herring)	1.1 ng/g (tuna)	-
TBT (organotin)	2 out of 4 analysed	0.2 ng/g (tuna)	0.8 ng/g (pickled herring)	-

The "Chain of Contamination"

The "Chain of contamination" represented here describes the complex journey that chemicals can take as they travel around the globe and includes chemical producers, consumer products, wildlife and humans. Some of the parts of this complex chain have been highlighted by the monitoring studies of WWF and other NGOs (analysis of blood[32], umbilical cord blood[33], breast milk[34], household dust[35]) as well as other organisations, governments and institutions. For example, the Centre for Disease Control and Prevention (CDC) in the US has carried extensive biomonitoring[36] and the European Commision is setting up a biomonitoring database for member states[37].
The preliminary food results generated by the current study add to this overall picture and help to illustrate how all the parts of the chain are connected and contaminated.

Wildlife
Persistent man-made chemicals can increase in concentration as they move up the food chain for example, from plankton to fish to seals to polar bears accumulating in the bodies of wildlife species and contributing to serious health impacts[27].

Food Chain
The global food chain is contaminated with hazardous chemicals such as DDT, PCBs and brominated flame retardants. As a result, food is a major source of exposure for humans and wildlife. Meat, fish, dairy products, vegetables and fruit can all contain traces of man-made chemicals.[22, 23]



Global Environment
Hazardous chemicals can be released into the environment during manufacture, transport, storage and the disposal of waste, as well as directly from consumer products (see below).

They can travel via air and water currents around the globe and accumulate in soils, sediments, rivers, estuaries and oceans and enter the food chain of wildlife and humans. Even remote, pristine areas such as the Arctic, far from industrial activities, are polluted with man-made chemicals[31].

Humans
Hazardous chemicals are commonly found in human blood[24] and can be passed to a developing baby through the placenta[25] and breast milk[26]. The main routes by which humans are exposed to chemicals are through food, inhalation of indoor (and outdoor) air and absorption through the skin.

Manufacture/ Industry
Currently only 14% of the chemicals used in the largest volumes have the minimum amount of data publicly available to make an initial basic safety assessment[30]. Some of these chemicals have hazardous properties – they may disrupt hormones, or be carcinogenic, persistent, bioaccumulative, or toxic to reproduction.

Products
Chemicals can escape from consumer products during use and leach out of landfills following their disposal. They can enter indoor air and dust[28, 29] and reach soil, groundwater, rivers and oceans – exposing wildlife and humans.

22 WWF-UK (2006). Chain of Contamination: The Food Link. (wwf.org.uk/chain)
23 Cascade. (www.cascadenet.org)
24 WWF-UK (2005). ContamiNATION: Results of WWF Biomonitoring Survey. (wwf.org.uk/chemicals/publications.asp)
25 WWF-UK and Greenpeace (2005). A Present for Life: Hazardous chemicals in umbilical cord blood (wwf.org.uk/chemicals/publications.asp)
26 Friends of the Earth Europe (2005). Toxic Inheritance More than 300 pollutants in breast milk – Time for a new chemicals policy. (www.foeeurope.org/publications/2005/toxic_inheritance.pdf)
27 WWF International Arctic Programme and WWF-DetoX (2006). Killing them softly: Health effects in Arctic wildlife linked to chemical exposures. (http://assets.panda.org/downloads/arctic_report___8_pager.pdf)
28 The Ecology Center (2006). Toxic at any speed. (www.ecocenter.org/dust/ToxicAtAnySpeed.pdf)
29 Greenpeace (2003). Consuming chemicals: Hazardous chemicals in house dust as an indicator of chemical exposure in the home. (www.greenpeace.org.uk/MultimediaFiles/Live/FullReport/5679.pdf)
30 European Commission (2006). Environment fact sheet: REACH a chemicals policy for the EU. (http://ec.europa.eu/environment/chemicals/reach/fact_sheet.pdf)
31 WWF International Arctic Programme (2005). The Tip of the Iceberg: Chemical contamination in the Arctic. (http://assets.panda.org/downloads/the_tip_of_the_iceberg___summary.pdf)

32 WWF_UK (2003). ContamiNATION, the results of WWF's biomonitoring survey ; WWF-UK (2004). Contamination: the next generation http://www.wwf.org.uk/chemicals/publications.asp
33 Greenpeace and WWF-UK (2005). A Present for Life: hazardous chemicals in umbilical cord blood http://www.wwf.org.uk/filelibrary/pdf/presentforlife.pdf
34 Friends of the Earth Europe (2005). Toxic Inheritance – More than 300 pollutants in breast milk – time for a new chemicals policy http://www.foeeurope.org/publications/2005/toxic_inheritance.pdf
35 Greenpeace UK (2003). Consuming Chemicals - Hazardous chemicals in house dust as an indicator of chemical exposure in the home . http://www.greenpeace.org.uk/MultimediaFiles/Live/FullReport/5679.pdf
36 Department of Health and Human Services - Centers for Disease Control and Prevention (2005). Third National Report on Human Exposure to Environmental Chemicals http://www.cdc.gov/exposurereport/
37 EU Biomonitoring programme http://europa.eu.int/eur-lex/en/com/cnc/2003/com2003_0338en01.pdf

What does this mean?

The food results presented here and WWF's biomonitoring surveys show that we are all exposed to and contaminated with a cocktail of different hazardous chemicals. But despite this exposure there is currently insufficient health and safety data publicly available to assess the potential impacts of most of the chemicals in use in the EU today.

The levels found in these foods are unlikely to cause direct, immediate health effects (so consumers should not be alarmed or avoid these kinds of foods) but there are concerns over the effects of long term, low level exposure to chemicals in the diet, especially on the developing foetus, infants and young children. There is also the wider issue of the use of hazardous chemicals that continue to contaminate the global environment and the food we consume. WWF believes that chemicals should be subject to more effective regulation, such that over time our exposure, and that of our children, is reduced.

The long term health implication of exposure to many of the chemicals detected in this survey are not fully understood at present, but it is worth remembering that –

• Recent scientific findings show that many chemicals can act together in an additive way. This is crucial as humans are exposed to a wide range of chemicals. Individually they may be below "safe" levels, but together they may exceed a threshold level for adverse effects.

• Safe exposure levels for food are set by chemicals risk assessments. These are often based on insufficient data and involve general assumptions about how much we are exposed to certain chemicals. Patchy information on exposure routes and possible effects makes setting "safe" levels very difficult. General diet studies may also not address high intake users and may neglect the special risk for children.

• The developing foetus, infants and young children are particularly sensitive to chemicals. Exposure to chemicals during pregnancy can interfere with normal development of the foetus. It is the timing of exposure and not just the level of exposure that determines the possible negative effects. This is particularly true in the case of endocrine disrupters.

• Long-term low-level exposure during early life may result in unexpected effects, which may only become apparent many years later.

• For some chemicals there may be no safe levels, particularly in susceptible members of the population e.g. the developing foetus.

• Many of the chemicals humans are exposed to, which includes the majority of those detected in food, have bioaccumulative properties. As a result, their levels can continue to increase if they are not phased-out.

For more information on the background, uses and health implications of the chemicals in this study, see the accompanying fact-sheets (wwf.org.uk/chemicals/publications.asp).

Scientists' views

Many well-known scientists are becoming increasingly concerned as there is mounting evidence linking persistent, bioaccumulative and endocrine disrupting chemicals with negative health effects. Several declarations calling for a precautionary approach to the use of hazardous chemicals and endocrine disrupters have been signed by doctors and scientists from around the world[38, 39], including the Prague Declaration signed by scientists from the EU and USA. www.edenresearch.info/declaration.html

In addition, scientists within CASCADE, a European network focusing on endocrine disrupting chemicals in food, have expressed their concerns[40] about a watered-down REACH. The network stresses the importance of a robust and transparent REACH, to safeguard the progress of research on the health implications of chemicals.

Given the mounting concerns, WWF considers that the possible role of EDCs in not only adverse effects on fertility and children's brain development, but also in the increasing incidence of western diseases such as obesity and diabetes, needs to be fully investigated.

38 WWF Scientists' declaration on toxic chemicals http://www.wwf.org.uk/chemicals/declaration.asp
39 THE PARIS APPEAL - International Declaration on diseases due to chemical pollution http://www.artac.info/static/telechargement/PARISAPPEAL_SIGNATR.pdf
40 B. Demeneix et al, Vote REACH for the safer management of chemicals in EU, Financial Times, Nov 7 2005. More information about CASCADE: www.cascadenet.org

What WWF wants

For the first time since 1981, European chemical legislation is undergoing a major review. European governments have a once in a lifetime opportunity to ensure a safer future for our children and wildlife. The legislation, known as REACH, is one of the most important pieces of EU environmental and health legislation and the key votes are due to take place in October and November 2006.

There has been huge industry pressure to weaken this legislation and as the European Council position currently stands it will allow some carcinogens and chemicals that are toxic to reproduction (e.g. the phthalate DEHP) and hormone-disrupting substances (e.g. bisphenol A) to stay on the market, even if safer alternatives exist.

WWF is calling for REACH to:

1.
Phase out all persistent, bioaccumulative and endocrine disrupting chemicals.

2.
Substitute hazardous chemicals with safer alternatives where they are available. WWF sees no reason why we should risk the health of humans and wildlife by using known hazardous chemicals when safer alternatives exist.

3.
Set strict requirements on chemical producers to provide safety information before a chemical can be sold or continue to be used.

4.
Allow consumers to easily find out what chemicals are in everyday products.

For the full version of the study and related material, please see: wwf.org.uk/chain or contact Sophie Lindsay, Chemicals & Health Campaigns Officer on 01483 412505

"Being at the top of the food chain, humans are particularly exposed to chemicals in food. As some of these chemicals are similar to hormones, they interfere with our endocrine system and may be a risk factor for diseases like obesity, different forms of cancer and diabetes as well as reduced fertility. REACH is an important tool in regulating such chemicals. As researchers studying the endocrine system we argue that decisions on how a chemical is used must be based on scientific data. We therefore stress the importance of test data and information being easily accessible to the scientific community. Consumer information about chemicals in food is also important for choices of food items in everyday life."

Professor Jan-Åke Gustafsson, coordinator CASCADE

"Diet is an important exposure route for several man-made chemicals, including some with endocrine disrupting properties, which studies suggest may be linked to adverse health effects in wildlife and humans. A number of chemicals that contaminate food may also accumulate in the body and get passed on to the developing foetus. A strong REACH is crucial to ensure that the food chain does not continue to be contaminated and dietary exposures to endocrine disrupting chemicals are reduced".

Dr. Andreas Kortenkamp - Reader and Head of Centre for Toxicology, The School of Pharmacy, University of London.

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The mission of WWF is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by

- conserving the world's biological diversity
- ensuring that the use of renewable natural resources is sustainable
- reducing pollution and wasteful consumption

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