



MOMs... and POPs

**Persistent
Organic
Pollutants
in the diets of
pregnant and
nursing women**

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Acknowledgments

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Executive Summary

Everyone knows that women eat – and often crave – different foods when they're pregnant. But an Environmental Working Group (EWG) analysis of government data shows that some of the things they eat more of give their babies an extra dose of toxic pollutants at the most delicate stage of life. These persistent organic pollutants (POPs) include chlordane, dieldrin, DDT, heptachlor and heptachlor epoxide, hexachlorobenzene, and toxaphene.

Although men generally eat more, pound for pound, than women, this changes when women become pregnant or are nursing, when their caloric and nutrient requirements are at a lifetime high. Of the 50 foods that are most contaminated with POPs, there are 16 that women eat more of (relative to their weight) than men – including such staples as milk, hamburgers, cheese and butter (Table 1).

By following what her doctor recommends as a healthy diet during pregnancy and lactation, a woman will increase her intake of POPs during a time

when both she and her fetus are highly vulnerable to insult from environmental toxins.

Women commonly alter their diets during pregnancy and nursing to accommodate the nutritional needs of the fetus and infant. EWG's analysis of data on the eating habits of these women shows that this diet shift dramatically increases their own and their baby's exposure to highly toxic pollutants like DDT, hexachlorobenzene and other POPs. This exposure is of great concern because most POPs (including DDT) disrupt the normal function of the endocrine (hormone) system in the mother and the fetus.

Normal endocrine function is essential to the healthy development and functioning of many critical organ systems, particularly those involved in sexual development, reproduction, and behavior. Many scientists strongly suspect a link between fetal and neonatal exposure to POPs and the increase in a number of diseases including testicular cancer, hypospadias, endometriosis, and breast cancer. Other phenomena, such as the dramatic

Table 1. A pregnant or nursing woman eats more than the average man 16 of the 50 most heavily POP-contaminated foods in the U.S.

Most contaminated foods consumed more by pregnant women than men	Persistent Organic Pollutant
american cheese butter cheddar cheese cheeseburgers dill pickles hamburgers lasagna with meat peanut butter peanuts pepperoni pizza potato chips pumpkin pie raisins sour cream vanilla ice cream whole milk	dieldrin, DDT, heptachlor epoxide, hexachlorobenzene chlordane, dieldrin, DDT, heptachlor epoxide, hexachlorobenzene dieldrin, DDT, heptachlor epoxide, hexachlorobenzene dieldrin, DDT, heptachlor epoxide chlordane, dieldrin, DDT, toxaphene, heptachlor epoxide dieldrin, DDT, heptachlor epoxide, hexachlorobenzene dieldrin, DDT dieldrin, DDT, toxaphene, hexachlorobenzene dieldrin, DDT, toxaphene, hexachlorobenzene dieldrin, DDT chlordane, dieldrin, DDT, heptachlor epoxide dieldrin DDT dieldrin, DDT, heptachlor epoxide, hexachlorobenzene dieldrin, DDT dieldrin, DDT

Source: Environmental Working Group. Compiled from Food and Drug Administration Total Diet Study, 1991-1997, and U.S. Department of Agriculture's Continuing Survey of Food Intake by Individuals, 1994-1996.

drop in sperm count reported in many industrialized countries, and the significantly younger age at which children now reach puberty, are also linked to POPs exposure in the scientific literature.

POPs must be Banned Worldwide

Women should not feel guilt or take blame for the POPs in their food, and they definitely should not sacrifice nutrition to

avoid POPs. Instead, the food supply should be cleaned up.

Delegations from around the world enter a decisive phase of negotiations beginning March 20, 2000 with the potential to ban the production and use of a list of 12 officially sanctioned POPs (Table 2). These negotiations are critical to the women of the United States, the vast majority of whom still carry a dangerous body burden of at least some of these toxic compounds.

Table 2: Twelve POPs – the “Dirty Dozen” — targeted for a ban on use and production under a U.N. treaty now in negotiation.

Persistent Organic Pollutant	Application	Found by FDA on food
Aldrin	insecticide	
Chlordane	insecticide	Yes
DDT	insecticide	Yes
Dieldrin	insecticide	Yes
Endrin	insecticide and rodenticide	Yes
Heptachlor	insecticide	Yes
Hexachlorobenzene	fungicide and byproduct of pesticide production	Yes
Mirex	insecticide and flame retardant	
Toxaphene	insecticide	Yes
PCBs	liquid insulators in transformers; ingredients in some paints, adhesives, and resins	
Dioxins	byproducts of organochlorine production and incineration, and of wood pulp bleaching	
Furans	byproducts of organochlorine production and incineration, and of wood pulp bleaching	

Source: United Nations Environment Program website at <http://irptc.unep.ch/pops/> and Environmental Working Group analysis of Food and Drug Administration Total Diet Study, 1991-1997.

POPs levels in human tissue, breast milk and the food supply in the United States dropped during the 1970s and 1980s after most POPs were banned in this country. These declines have stopped, however, and the most recent data show that under current global use conditions, POPs contamination levels in the United States are not likely to drop below current levels. Worldwide controls on POPs are essential because by definition POPs persist in the global envi-

ronment, and because most POPs, including DDT and PCBs, can migrate great distances through the atmosphere, reaching even the Arctic. Thus, POPs can bioaccumulate up the food chain throughout the entire world.

By failing to push for a global ban on all POPs the U.S. government effectively guarantees the perpetual contamination of its own food supply and citizenry with these highly toxic compounds.

Table 3: FDA found seven POPs in 155 different foods from 1991 through 1997.

Persistent Organic Pollutant	Number of contaminated foods
Chlordane	15
DDT	136
Dieldrin	100
Endrin	3
Heptachlor	5
Heptachlor epoxide ⁽¹⁾	31
Hexachlorobenzene	31
Toxaphene	14

(1) degradation product of heptachlor

Source: Environmental Working Group. Compiled from Food and Drug Administration Total Diet Study, 1991-1997.

Findings

When they are pregnant or nursing, American women increase their consumption of at least 692 different foods, according to EWG's analysis of food consumption data from the U.S. Department of Agriculture. Many of these foods are contaminated with POPs. EWG's analysis of data from the Food and Drug Administration's Total Diet Study found six POPs from the U.N. list in 155 of these foods (Table 3). DDT and its metabolite DDE were by far the most pervasive, found in 136 foods, followed by the insecticide dieldrin in 100, and the pesticide by-products heptachlor epoxide and hexachlorobenzene in 31 different foods (Table 4).

Dioxin, among the most toxic of all POPs, is not routinely tested for by any government agency. It is well known, however, that dioxin contaminates the food supply, including foods that pregnant women eat more of than men, such as milk and other dairy products.

A healthy diet during pregnancy leads to an increase in POPs exposure

By following what her doctor recommends as a healthy diet during pregnancy and lactation, a woman will increase her intake of POPs during a time when both she and her fetus are highly vulnerable to insult from environmental toxins.

The wide-ranging health effects of POPs include cancer, neurodevelopmental effects such as reduced IQ, disruption of the hormone system, immune system suppression, nervous system disorders, and birth defects (Colburn 1996, DeVito 1995, EPA 1994). Many POPs fall into the class of chlorinated hydrocarbons known to disrupt the endocrine system, by mimicking or interfering with the action of hormones. Some broad classes of endocrine disruptors include those that mimic or block the action of the female sex hormone estrogen (estrogenic or anti-estrogenic compounds), and those that mimic or block the

Table 4. Pound for pound more than men, pregnant and nursing women eat many foods known to be contaminated with one or more persistent organic pollutants.

Persistent organic pollutant and number of contaminated foods	Most contaminated foods consumed more by pregnant women than men	Ranking of food contamination
Chlordane 15 contaminated foods	butter dill pickles	3 5
DDT and degradation products 136 contaminated foods	butter american cheese cheddar cheese cheeseburger sour cream hamburger peanut butter milk	1 4 6 8 12 17 21 33
Dieldrin 100 contaminated foods	dill pickles pumpkin pie butter peanut butter cheddar cheese peanuts American cheese	3 6 7 10 11 12 17
Heptachlor 5 contaminated foods	plain bagels cracked wheat bread	3 4
Heptachlor epoxide 31 contaminated foods	cheddar cheese butter american cheese dill pickles cheeseburger potato chips	3 4 6 9 13 15
Hexachlorobenzene 31 contaminated foods	butter cheddar cheese american cheese sour cream watermelon fried chicken	1 5 7 10 11 14
Toxaphene 14 contaminated foods	peanuts peanut butter dill pickles strawberries	1 2 4 11

Source: Environmental Working Group. Compiled from Food and Drug Administration Total Diet Study, 1991-1997, and U.S. Department of Agriculture's Continuing Survey of Food Intake by Individuals, 1994-1996.

DIETARY REQUIREMENTS FOR CALCIUM AND PROTEIN

During pregnancy and nursing a woman's nutritional requirements are at an all time high and her diet is modified accordingly. Compared to men or non-pregnant and non-nursing women, these women ingest more of at least seven POPs that are associated with a variety of adverse health effects from hormonal related conditions to cancer.

The average pregnant woman increases her intake of calcium by 85 percent, from 625 milligrams (mg) per day to 1154 mg/day. While she is nursing, a woman's intake of calcium is 68 percent higher than normal, at 1050 mg/day (Institute of Medicine, 1997). Most pregnant and nursing women increase their calcium intake by ingesting more milk and cheese. By doing this, these women also increase their intake of POPs found in milk and cheese, which include dieldrin, the DDT breakdown product DDE, heptachlor epoxide and dioxin.

Protein requirements for women are also greatly increased during pregnancy and lactation. The Recommended Dietary Allowance for protein increases by 68 percent during pregnancy, and by 45 percent during lactation, relative to the 44 gram/day requirement for non-pregnant women 23 to 50 years of age. Most women increase their protein intake by eating more meat and dairy products, which are high on the food chain and can be high in fat relative to other types of foods. As a result they contain relatively high levels of certain POPs, including DDE, dieldrin, and dioxin.

action of male sex hormones called androgens (androgenic or anti-androgenic compounds). For a pregnant woman, the proper functioning of her and her fetus' hormone system is critical. If hormones function improperly, fetal development can be altered, with permanent repercussions for the child.

Research surrounding one estrogen mimic, DES (diethylstilbestrol), shows that exposure to these compounds during pregnancy can lead to unforeseen and serious health effects for the offspring. DES was administered to pregnant women during the 1940s through 1960s to prevent

miscarriage and preeclampsia in high-risk pregnancies, but later to promote healthier babies as well. After decades of use, the drug was linked to the development of an otherwise extremely rare malignancy, clear-cell carcinoma of the vagina, in young female offspring who were exposed to the drug in the womb (Herbst, 1999). Notably, the critical health effect occurred not in the mother, but in her offspring. The third generation in this line of women are only now reaching puberty, and it is unknown if their grandmother's maternal exposure to DES will also impact their health.

The experience with DES is significant because it showed that a pregnant woman's exposure to endocrine-disrupting compounds, like many of the POPs, can adversely affect the health of her offspring, and that these health effects can manifest many years after birth.

Dioxin is among the most toxic of the 12 U.N.-sanctioned POPs. One of dioxin's estrogenic effects is to feminize adult male animals. It has also recently been linked to endometriosis in monkeys, in a long-term dose-response study (Rier et al 1995). This disease, characterized by the growth of uterine tissue outside the uterus, can impair a woman's ability to become pregnant, and occurs in an estimated 20 to 40 percent of women in the U.S. (Grassman, 1998). Dioxin has also been linked to hypospadias, a male birth defect of the penis that doubled in occurrence in the U.S. in the 1970s and 1980s (Paulozzi et al 1997).

For a woman, excess estrogen exposures are a risk factor for gynecologic cancers, as well as for non-cancerous tissue growth that results in endometriosis and fibroid tumors. The potential impact of estrogenic compounds on the intensely hormone-dependent process of fetal development is enormous. The POPs under consideration by the U.N. this week include a number of estrogenic compounds, including dioxin, some PCBs, and toxaphene.

An overwhelming reduction in the alligator population of Florida's Lake Apopka has been traced to an extensive spill of DDT and other pesticides 20 years ago. Abnormalities found in young alligators included abnormal ovaries and elevated estrogen in females, and low testosterone levels and small penises in males, all effects of marked endocrine disruption (see, for example, Semenze et al, 1997). At first DDT and its metabolite DDE were thought to be estrogenic, but more thorough research determined that rather than mimicking estrogen, DDT and DDE were blocking the male androgens.

A woman's past exposure to POPs can have far-ranging impacts that include even her ability to nurse her child. Two studies have reported that women with higher levels of DDE in their blood nurse their babies for significantly shorter periods of time than women with lower levels. The researchers found this outcome in women from two very different geographic areas -- North Carolina and rural Mexico. Exactly how, or to what extent, this estrogen mimic shortens the lactation process is not known (Rogan and Gladen, 1985 and Gladen and Rogan 1995). POPs-induced early weaning could have an important effect on child mortality worldwide, since breast-feeding prevents diarrheal disease, the major cause of infant mortality in much of the world.

Even after birth, an infant continues to be significantly affected by his or her mother's exposures, as the mother passes POPs on to her child through her breast milk. Essentially all human milk examined for the last fifty years worldwide has had measurable levels of POPs, including PCB and DDE. Through breast milk, infants can ingest a much higher dose, pound for pound, than an adult gets on an average day. For instance, infants ingest about 70 picograms/kg/day of dioxin during an average day of nursing, ten times the average adult's daily dose (Grassman et al, 1998).

Research shows that the first baby a mother nurses probably receives the highest dose of POPs. Scientists found that women have higher levels of PCBs and DDE in breast milk from their first lactation and in the earlier samples of a given lactation, and that levels decline both with time spent nursing and with each subsequent child nursed. They conclude that "these striking declines are presumably a measure of exposure to the child" (Rogan et al, 1986).

Notwithstanding these risks, breast-feeding clearly is the preferred way to nourish a newborn. The challenge for policymakers is to end harmful contamination of mother's milk.

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