Toxic Food:

U.S. Children at Risk from Chemicals in Their Daily Diet

Healthy Child Healthy World
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Healthy Child Healthy World empowers parents to take action and protect children from harmful chemicals.

We are a California non-profit organization that works to create programs and initiatives that:

• Demand corporate accountability
• Engage communities for collective action
• Support safer chemicals and products
• Influence legislative and regulatory reform

By working with manufacturers and supporting policy initiatives, Healthy Child has helped to transform the marketplace to encourage safer environments for children. For the past 20 years, Healthy Child has provided access to critical information that encourages smarter lifestyle choices to reduce toxic chemical exposure in homes and communities to become a trusted resource for parents. Healthy Child’s vision is a world where every child has the opportunity to grow-up in a healthy and safe environment.

To learn more, visit HealthyChild.org
Introduction: Children’s Unique Vulnerability

For most of human history, people have eaten relatively simple diets. Food came from whatever you could catch, kill, pick, or grow – from nature. And, the only manipulation was via mixing those ingredients and then either cooking, curing, drying, pickling or some other type of basic preservation.

These days, the picture is much more complicated. So complicated, in fact, that we can’t even fully uncover the story of many common foods. Most ingredients may have started on a farm, but they’re increasingly modified and manipulated in factories and laboratories. Other additives and residues from manufacturing are entirely synthetic and have only recently been introduced into the human diet.

They say you are what you eat, but what are you really eating? More importantly, what are our children eating?

Not only do children have unique nutritional demands for their rapid growth and development, but their bodies are also uniquely vulnerable and place them at higher risk than adults.

- Pound-for-pound, children drink more and eat more food than adults. For example, the US Agency for Toxic Substances and Disease Registry (ATSDR) reported that "children in the first six months of life drink seven times as much water per pound as average American adults. Children one through five years of age eat three to four (or more) times as much food per pound body weight as average American adults."\(^1\) Children also tend to consume more of certain foods than adults do, such as fruit juice, fruit and cow’s milk.\(^2\) Due to the fact that children’s diets are less varied and because they consume more food than adults in proportion to their body weight, they may be exposed to higher levels of contaminants in food.

- From birth through childhood, children differ from adults in their ability to absorb, metabolize, and excrete some contaminants via the kidneys or bile.\(^1\) This means those contaminants have toxic effects on a child, but not an adult.\(^3\)

- Children’s bodies are rapidly growing and developing. The unique developmental stages that are part of childhood make children more vulnerable to harmful effects from exposures to certain hazards than adults.\(^2\) For example, during brain development, lead and methylmercury exposures can result in permanent deleterious impacts on a small child while having no measurable impact on an adult.\(^4\)
Today’s children are predicted to be the first generation to live sicker and die younger than their parents. And, it’s already well established that poor diets play a large role in that outcome. But, we believe there’s still much more to uncover and much more risk lurking in our grocery stores than the food industry would like the public to know. This paper will shed light on some of those hidden risks by compiling existing research and tracing the issue from farm to fork. We’ll also identify some solutions for policy makers and parents. (Parent should also refer to our companion e-book, “Easy Steps to Healthier, Safer Foods” for a more expansive list of practical steps to take at home.)

It’s worth noting that this is an extremely abbreviated exploration of the issue. Books upon books have already been written about specific pieces of this story and there could be dozens more written to fill the gaps. Just as our modern diets are complicated, the full story of our modern food system is so complex and convoluted it nears incomprehensibility.

For the purposes of this paper, we’re trying to keep it concise and understandable – to cull some of the most compelling facts and data and demonstrate very quickly what our children are being exposed to every day. With that said, before diving into our examination of today’s toxic food, there are three basic concepts to understand:

- We’ll be highlighting the presence of many chemicals in our modern diets, but we recognize that all of life is made of chemicals. (Plants, people and even water are made of chemicals.) Our focus is on synthetic chemicals and novel combinations of chemicals that humans have not been exposed to until recently.
- The term “processed food” can technically apply to food that’s been manipulated by almost any method – including someone making homemade pickles. Our focus and concern is regarding mass processed foods from factories that strip them of vital nutrients using harsh chemical processes and then add countless chemical additives and preservatives.
- The above two points are not all inclusive indictments of synthetic chemicals, processed foods and our modern diets. Sometimes synthetics can be safer than naturally-sourced elements. Some additives, like folate and other vitamins have helped reduce disease. Preservatives have arguably prevented foodborne illnesses and deaths.

The ultimate root of the problem lies in the fact that our modern food system is an elaborate experiment and our children are the guinea pigs. It’s time to open our eyes and try to understand what we’ve done – and start taking action to fix it.

**The Story of Our Modern Diets: From Farm to Fork**

Walk any grocery store aisle or page through a magazine and look at the images of farms on food packaging and ads. They’re all rolling green hills, contented cows, and general bucolic bliss. A pretty picture of our wholesome past and a place we’d like to think our food comes from, but the reality is starkly different. Those small, sweet farms are a dying breed and currently 80 percent of our food and fibers come from only 10 percent of the over two million farms in the
These are massive factory farms associated with significant environmental and health impacts whose final products are of questionable quality to say the least.

Consider the typical confined animal feeding operation (CAFO), which can house tens of thousands of animals (and in the case of chickens, up to 100,000) under one roof, in inhumane, filthy, disease-ridden conditions. What’s being fed to the animals you eat?

- A cocktail of drugs to make them grow faster, produce more milk, and treat diseases associated with poor living conditions. Currently, 80 percent of all antibiotics sold in U.S. (over 29 million pounds annually) go to farm animals.¹⁸
- U.S. law allows for the following additions to standard animal feed: same species meat; diseased animals; feathers, hair, skin, hooves, and blood; manure and other animal waste; and even plastics, which serve as cheap and filling feed.⁹
- For decades, producers have been adding things like chocolate bars, gummy worms, ice cream sprinkles, marshmallows, bits of hard candy and even powdered hot chocolate mix to animal feed in order to cut costs. (Corn can cost about $315 a ton and ice-cream sprinkles can be purchased for as little as $160 a ton.)¹⁰

Our croplands are seeing the same type of synthetic, unnatural and downright toxic inputs, as well.

- According to the U.S. Environmental Protection Agency (EPA), nearly 900 million pounds of pesticides are applied to farms every year.¹¹-¹²
- Since the 1990s, millions of tons of potentially toxic sewage sludge have been applied to millions of acres of America’s farmland as food crop fertilizer.¹²-¹³
- Experimental genetically modified seeds are increasingly being used for major U.S. crops like canola (about 90 percent of U.S. crop), corn (about 88 percent of U.S. crop), and soy (about 94 percent of U.S. crop).¹⁴-¹⁶ These crops are a primary source of animal feed and found in 70 percent of all processed foods.¹⁴-¹⁶

This is just the beginning. Most of our food goes from farm to factory where further inputs and chemical processing occurs. It’s estimated that nearly 6,000 additives and chemicals are used by food companies to process our food.¹⁵ Soybeans are soaked in hexane (a byproduct of gasoline refining) to cheaply and efficiently separate their oil from their protein.¹⁵,¹⁸ And, in order for wheat to become the white flour used in popular baked goods, it undergoes bleaching with various chemical agents including oxide of nitrogen, chlorine, chloride, nitrosyl, and benzoyl peroxide mixed with a variety of chemical salts.¹⁸

There are over 3,000 ingredients in the U.S. Food and Drug Administration’s (FDA) database of approved additives. Some of these include things like sugar, baking soda, and salt, but many are synthetic, petroleum-derived additives and even leachates from packaging.¹⁸ (Chemicals used to make plastics sometimes migrate into food and the FDA considers these migrants “indirect food additives.”) A few of the toxic chemicals that have been found in various foods due to leaching from packaging include fire retardants in butter; polyvinyl chloride (PVC) in margarine, mayonnaise and processed cheese; styrene in instant noodles; and nonylphenol in apple juice and baby formula.¹⁹
Add in trace contaminants from environmental pollution (like dioxins and PCBs) and toxics created during food preparation (like acrylamide and PAHs) and you have a recipe with far too many questionable, unwanted ingredients.

**Average Daily Diet for U.S. Children and Potential Exposures**

Public health discourse regarding the diets of our nation’s children regularly addresses nutrient deficits, empty calories, excessive fat, sugar and salt, but what about all of the toxic chemicals in food? Based on government surveys and peer-reviewed studies published in academic journals, we’ve constructed a sample menu outlining the average diet of a toddler in the U.S.

We’ve also listed some of the more common contaminants associated with each food to demonstrate our children’s cumulative daily exposure to toxics in food. *(For descriptions of these chemicals and their potential health impacts, see Appendix A.)*

This is a simplified extrapolation of very complex evidence and we cannot infer actual exposure levels. Not every American child eats this exact diet every day. But, we share it to give a general sense of the problem.

**Sample Toddler Menu & Potential Contaminants**

- **Breakfast:**
  - Cereal - GMOs, acrylamide, artificial food coloring (depending on the cereal), BHA/BHT, HFCS
  - Milk - antibiotics, pesticides (Diphenylamine, DDE p,p', Dieldrin), rBGH, dioxin, PBDE
  - Apple Juice - pesticides (Thiabendazole, Acetamiprid), inorganic arsenic
  - Banana - pesticides (Thiabendazole, Imazalil)

- **Snack:**
  - Fruit Drink - artificial food dyes, artificial flavoring, HFCS
  - Crackers - acrylamide, BHA/BHT, GMOs, HFCS, potassium bromate
  - Cheese - antibiotics, pesticides (Diphenylamine, DDE p,p', Dieldrin), rBGH, dioxin, aluminum additives, artificial dyes, PBDE

- **Lunch:**
  - French Fries - acrylamide
  - Hamburger - antibiotics, hormones, dioxin, PAHs, HCA, PCBs, PBDE, DDT
  - Bun - HFCS, GMOs, acrylamide, potassium bromate
  - Apple - pesticides (Thiabendazole, Diphenylamine, Azinphos methyl, Imidacloprid)

- **Snack:**
  - Chips - acrylamide, BHA/BHT, GMOs
  - Soda - BVO, artificial food dyes, HFCS, BPA

- **Dinner:**
○ Mac & Cheese - artificial food dyes, GMOs, aluminum additives, Azodicarbonamide, HFCS
○ Baby Carrots - pesticides (Linuron, Trifluralin, DDE p,p')
○ Milk - antibiotics, pesticides (Diphenylamine, DDE p,p', Dieldrin), rBGH, dioxin, PBDE

● Dessert:
  ○ Cookies - acrylamide, aluminum additives, BHA/BHT, GMOs, HFCS

**Childhood Diseases on the Rise**

What are the cumulative impacts of eating all of these chemicals day in and day out? We'll likely never know exactly.

What we do know is that Americans rank among the lowest of industrialized nations in terms of life expectancy. And we know that more than 30 years of environmental health studies have led to a growing consensus that chemicals are playing a role in the incidence and prevalence of many diseases and disorders.

- One in three children born in 2000 will develop Type-2 Diabetes, a disease previously unknown among children that has become epidemic.
- One in three babies are overweight or obese by nine-months-old. Childhood obesity has more than doubled in the past 10 years.
- Childhood leukemia and brain cancer have increased sharply in incidence. Between 1975 and 2004, primary brain cancer increased by nearly 40 percent and leukemia by over 60 percent among children 14 years and younger. Cancer is now the second leading cause of death in childhood in the U.S., exceeded only by deaths from injury.
- Asthma, which has more than doubled in frequency since 1980, is now the leading cause of emergency room visits, hospitalizations and school absenteeism.
- Autism Spectrum Disorders, the diagnosis of which has increased more than 10 times in the last 15 years, now impacts one in every 88 children.
- Food allergies have increased in prevalence nearly 20 percent in the last 15 years and now impact four out of every 100 children.

While many factors play into these increases, the nearly ubiquitous presence of novel and toxic chemicals in our everyday diets certainly play one of the most significant roles.

This is a massive failure of our chemical regulatory system.

**FAILURES OF THE SYSTEM**

The U.S. regulatory system for food is one of the oldest and most regulated out of all of our country’s consumer product regulatory systems. Ironically it still has enormous loopholes. Fundamentally, industry has consistently battled the best intentions of Congress to allow for flaws that seriously compromise the end products.
Back in 1906 the U.S. Congress, after more than 25 years of debate, passed the U.S. Pure Food and Drugs Act. Concerned that the proposed standards might be too strict, food industries inserted a so-called "distinctive name proviso" into the law. By way of this proviso, food manufacturers could create low quality foods with distinctly misleading names – like “bred spred” posing as jelly, but with no fruit content whatsoever.

Over twenty years later, in 1933, the first Farm Bill was created to address national hunger, a broken economy, and failing farms in an effort to ensure healthy food and fair prices for farmers. This emergency legislation has been consistently eroded and changed over time to create our current Farm Bill, which now fuels factory farming and giant agricultural interests with unprecedented amounts of corporate welfare.

Combine these significant failures with a handful of other, smaller flaws and you have a food system built to make a few corporations a lot of money and the rest of us sick.

How does the U.S. stack up to other countries? Here’s a small example of the kinds of practices and ingredients that are perfectly legal in the U.S., but not in other countries.

- Butylated Hydroxyanisole (BHA). This preservative mentioned in the chemicals chart (page 10) is identified as a carcinogen by the International Agency for Research (IARC) on Cancer and banned in Europe and Japan.
- The common use of hormonal active growth promoters ("hormones") in farm animals can increase the production of veal and beef significantly – up to 15 percent. However, the European Union (EU) has banned this practice since 1989 and refuses imports of American meat raised using these hormones.
- BVO has been added to sodas for decades in the U.S., but it was originally patented as a flame retardant for plastics and is banned in food throughout Europe and Japan.
- rBGH is a genetically modified hormone administered to cows to increase milk production and was approved by the FDA in 1993; however, it is banned by the EU, Japan, Australia, New Zealand and Canada.
- Potassium bromate has been banned from use in food products in the EU, Canada, Nigeria, Brazil, Sri Lanka, China and many other countries. In the U.S., it’s considered safe.

It’s Time to Take Action

Healthy Child Healthy World recommends parents—and anyone concerned about children’s health—take the following steps:

1. Eat safer, healthier foods. Start by buying less processed foods and more whole, fresh foods. Opt for organic when you can. Consumers can find guidance with Healthy Child Healthy World’s Easy Steps program and Safer Foods Toolkit (including our new, free e-book) found at Healthychild.org.
2. **Contact the manufacturers of the processed foods you buy to demand safer ingredients, additives and packaging.**
   - Visit healthychild.org/what-we-do/promoting-solutions/advocacy-campaigns/ to learn about Healthy Child Healthy World’s market campaigns. We’re currently asking Kellogg’s to remove artificial food dyes from their fruit snacks and over 200,000 people have signed-on to show their support!
   - We are also working with Friends of the Earth on a new “Pledge for GE-Free Seafood” campaign in which we aim to get commitments from grocery stores, restaurants and chefs to not sell GE salmon or any other GE seafood if they were to reach the market. Learn more about this effort and how you can get involved at foe.org/gefreeseafood.

3. **Contact your federal and state elected officials.** Ask them to support more effective regulations of chemicals. Send a letter with a picture of your family and maybe even a drawing or letter from your child. Visit USA.gov to find out who your representatives are and how to contact them.
   - Join us and over one million Americans in telling the FDA and Congress to label genetically engineered foods! Visit justlabelit.org to learn more and sign-on today.

4. **Help spread the word.** Tell your friends, family, and colleagues. Tweet about it. Blog about it. Send a letter-to-the-editor to your local paper. Choose what feels right to you and let your voice be heard.

Children are 30 percent of our population, but 100 percent of our future. They need our protection.

**APPENDIX A**

**Common Chemicals in Food and Potential Health Impacts**

- **Diazinon.** Found in grown grapes, apples, pears, strawberries, cherries, peaches, nectarines, and sweet bell peppers. Associated with lung, intestine, bladder, heart, muscle and brain damage; headaches, blurred vision and memory problems; and childhood cancers.\(^{21-23,25}\)
- **Parathion.** Found in grapes, apples, pears, strawberries, cherries, peaches, nectarines, and sweet bell peppers. Linked to fertility disruption and death.\(^{21,22,24,25}\)
- **Carbendazim.** Found in apple sauce and orange juice. Suspected hormone disruptor and possible carcinogen.\(^{21,22,25,26}\)
- **Thiabendazole.** Found in apples, bananas, pears, mushrooms, mangoes, carrots, potatoes, avocados, and citrus. Known developmental and reproductive toxicant and probable carcinogen.\(^{21,22,25,27}\)
- **Linuron.** Found in carrots. Known developmental and reproductive toxicant and suspected hormone disruptor.\(^{25,28}\)
- **Carbaryl.** Found in grape juice. Known neurotoxicant and developmental and reproductive toxicant, probable carcinogen, and suspected hormone disruptor.\(^{25,28}\)
- **DDE p,p'**. Pesticide found in milk. Known carcinogen, known developmental and reproductive toxicant, and suspected hormone disruptor.\(^{25}\)

- **Formetanate Hydrochloride**. Found in nectarines. Known neurotoxicant.\(^{25}\)

- **Imazalil**. Found in oranges and bananas. Known developmental and reproductive toxicant and probable carcinogen.\(^{25}\)

- **Captan**. Found in strawberries. Known carcinogen.\(^{25}\)

- **Butylated Hydroxyanisole (BHA)**. Preservative used in processed foods like chips, red meat, baked goods, snack foods, chewing gum, cereal, and butter. Identified as a carcinogen by the IARC. Also suspected to disrupt hormones and impact male fertility.\(^{21,29}\)

- **Butylated Hydroxytoluene (BHT)**. Preservative used in processed foods like chips, red meat, baked goods, snack foods, chewing gum, cereal, and butter. Identified as a carcinogen by the IARC. Also suspected to disrupt hormones and impact male fertility.\(^{21}\)

- **Aspartame**. Artificial sweetener used in diet sodas, yogurts, cooking sauces, flavored water, sugar-free products, and cereals. Much conflicting research, but independent studies have found increased risk of cancer and preterm delivery of babies.\(^{30}\)

- **Saccharin**. Artificial sweetener used in diet, no-sugar-added products. Linked to several types of cancer, and increase in the potency of other cancer-causing chemicals.\(^{30}\)

- **Hormonal active growth promoters ("hormones")**. Found in beef, lamb and farmed fish products. Linked to hormonal imbalance, developmental and reproductive problems, and increased cancer risk.\(^{32-34}\)

- **Antibiotics** (ie. aminoglycosides, cephalosporins, ionophores, lincosamides, macrolides, penicillins, sulfas, and tetracyclines). Found in beef, dairy, eggs, poultry, pork, turkey, and farmed fish. Linked to E. coli outbreaks and antibiotic resistant bacteria.\(^{8,33,35}\)

- **Aluminum additives (sodium aluminum sulphate and potassium aluminum sulphate)**. Used in processed cheeses, cheese spread, baked goods (cookies, muffins, cupcakes, etc.), macaroni and cheese, microwavable popcorn, and instant pancake/soup mixes. Capable of causing adverse effects related to reproduction, neurological behavior, and neurological development.\(^{21,36}\)

- **Diacetyl**. Used as an artificial flavor in microwavable popcorn, snack foods, candy, and baked foods. Linked to respiratory problems and lung disease with chronic inhalation.\(^{21}\)

- **Monosodium glutamate (MSG)**. Flavor enhancer used in soup, salad dressing, chips, frozen entrees, and restaurant foods. Reactions to MSG include headache, nausea, weakness, wheezing, changes in heart rate, and difficulty breathing.\(^{21,90,91}\)

- **Bisphenol-A (BPA)**. Found in canned foods and beverages. Linked to breast and prostate cancer, regional decline in sperm counts, abnormal penile/urethra development in males, early sexual maturation in females, increased neurobehavioral problems, increased prevalence of obesity and type 2 diabetes, and immune system effects.\(^{37}\)

- **Sodium Nitrite/Nitrate**. Used in processed meats like bacon, hot dogs, sausages, and cold cuts. Linked to various types of cancer.\(^{90}\)

- **Polycyclic aromatic hydrocarbons (PAHs)**. Created by cooking meat, poultry, or fish at very high temperatures. Linked to various types of cancer.\(^{21,38}\)

- **Heterocyclic amines (HCA)**. Created by cooking meat, poultry, or fish at very high temperatures. Linked to various types of cancer.\(^{21,38}\)
• **Acrylamide.** Formed by cooking starchy foods at high temperatures: chips, fries, chicken tenders, biscuits, bread, cereal, cookies, crackers. Known carcinogen.\(^{39,40}\)

• **Brominated vegetable oil (BVO).** Used in fruit flavored drinks, sodas, and sports drinks. Studies suggest that BVO could be building up in human tissues and big doses caused reproductive and behavioral problems in animal studies.\(^{41}\)

• **Artificial Food Coloring/Dyes** (Red 40, Red 40 Lake, Blue No. 1, Blue 1 Lake, Blue No. 2, Blue 2 Lake, Yellow No. 5, Yellow No. 6): Used in a wide variety of processed foods, candies, medication, and more. Linked to neurological impacts and ADHD.\(^{21,30,42}\)

• **Acesulfame-K.** Artificial sweetener used in baked goods, chewing gum, gelatin desserts, and diet soda. Preliminary studies show links to cancer and thyroid impacts.\(^{30}\)

• **Methylmercury.** Heavy metal contaminant found at concerning levels in fish including albacore tuna, shark, swordfish, King Mackerel, tilefish, and trout. Impacts brain and kidney function in adults and can cause permanent nervous system damage in fetuses and children.\(^{21,43,92}\)

• **Polychlorinated Biphenyls (PCBs).** Contaminant found in fish, meat, poultry, and eggs. Linked to acne-like skin conditions in adults and neurobehavioral and immunological changes in children. PCBs are known to cause cancer in animals.\(^{44}\)

• **Polybrominated diphenyl ethers (PBDEs).** Contaminant found in meat and dairy products. Linked to thyroid and hormone disruption, neurodevelopmental deficits, and cancer.\(^{45,46}\)

• **Recombinant bovine growth hormone (rBGH/rBST).** Found in milk, cheese, ice cream, and yogurt. Milk from rBGH-treated cows contains higher levels of IGF-1 (Insulin Growth Factor-1) and elevated levels in humans have been linked to colon and breast cancer.\(^{47-49}\)

• **Dichlorodiphenyltrichloroethane (DDT).** Contaminant found in fish, meat, and poultry (especially fatty kind), as well as imported foods from countries that still allow the use of DDT to control pests. Linked to liver cancer, nervous system damage, and reproductive impacts.\(^{50-52}\)

• **Dioxins.** Contaminant found in fatty meats, fish/shellfish, poultry, and eggs. Linked to cancer, liver damage, disruptions to the endocrine system, weakened immune system, and birth defects.\(^{52-54}\)

• **Inorganic arsenic.** Contaminant found in meat, poultry, many rice products, and apple juice. Known carcinogen.\(^{54-58}\)

• **Genetically modified organisms (GMOs).** Found in about 70 percent of processed foods that include ingredients derived from corn, soy, cottonseed oil, canola, and sugar beets. Animal studies show organ damage, gastrointestinal and immune system disorders, accelerated aging, and infertility.\(^{59-66}\)

• **Potassium bromate.** Additive in white flour, breads, and rolls. Known to cause cancer in animals.\(^{28}\)

• **High fructose corn syrup (HFCS).** Sweetener added to most processed foods including baked goods, sauces, dressing, cereal, snacks, cookies, and more. Genetically modified ingredients with potential toxic mercury contamination and obesogenic properties.\(^{67,68}\)
- **Perfluorochemicals (PFCs).** Contaminant from food packaging used for fast food, microwave popcorn, and other non-stick coatings. Linked to smaller birth weight and size in newborn babies, elevated cholesterol, abnormal thyroid hormone levels, liver inflammation, and weaker immune defense against disease.\(^69\)
- **Sulfur dioxide.** Used in dried fruits and vegetables, soft drinks and alcoholic beverages. Can induce asthma in sensitive individuals.\(^70\)
- **Dieldrin.** Banned pesticide that persists in the environment and often contaminates milk and dairy products. Linked to neurotoxicity, negative impact on the liver and decreased ability to fight infections in animal studies.\(^21,71\)

References


