How to Eat

CR tested popular fast foods and supermarket staples for some of the chemicals used to make

by LAUREN F. FRIEDMAN photograph by SARAH ANNE WARD

Less Plastic

plastic, which can be harmful to your health. Here's what we found—and how to stay safer.

By the time you open a container of yogurt, the food has taken a long journey to reach your spoon. You may have some idea of that journey: From cow to processing to packaging to store shelves. But at each step, there is a chance for a little something extra to sneak in, a stowaway of sorts that shouldn't be there.

That unexpected ingredient is something called a plasticizer: a chemical used to make plastic more flexible and durable. Today, plasticizers—the most common of which are called phthalates—show up inside almost all of us, right along with other chemicals found in plastic, such as bisphenols like BPA. These have been linked to a long list of health concerns, even at very low levels.

Consumer Reports has investigated bisphenols and phthalates in food and food packaging a few times over the past 25 years. In our new tests, we checked a wider variety of foods to see how much of the chemicals Americans actually consume.

The answer? Quite a lot. Our tests of nearly 100 foods found that despite growing evidence of potential health threats, bisphenols and phthalates remain widespread in our food.

The findings on phthalates are particularly concerning: We found them in almost every food we tested, often at high levels. The levels did not depend on packaging type, and no one particular type of food—say, dairy products or prepared meals—was more likely than another to have them.

For example, we found high levels in, among other products, Del Monte sliced peaches, Chicken of the Sea pink salmon, Fairlife Core Power high-protein chocolate milkshakes, Yoplait Original French vanilla low-fat yogurt, and several fast foods, including Wendy's crispy chicken nuggets, a Chipotle chicken burrito, and a Burger King Whopper with cheese. Organic products were just as problematic: In fact, the highest phthalate levels we found were in a can of Annie's Organic cheesy ravioli.

Yet some products had much lower levels than others. A serving of Pizza Hut's Original Cheese Pan Pizza, for example, had half the phthalate levels of a similar pizza from Little Caesars. Levels varied even among products from the same brand: Chef Boyardee Big Bowl Beefaroni pasta in meat sauce had less than half the level of the company's Beefaroni pasta in tomato and meat sauce.

"That tells us that, as widespread as these chemicals are, there are ways to reduce how much is in our foods," says James E. Rogers, PhD, who oversees product safety testing at CR.

The trouble is, there are so many ways these chemicals enter our food.

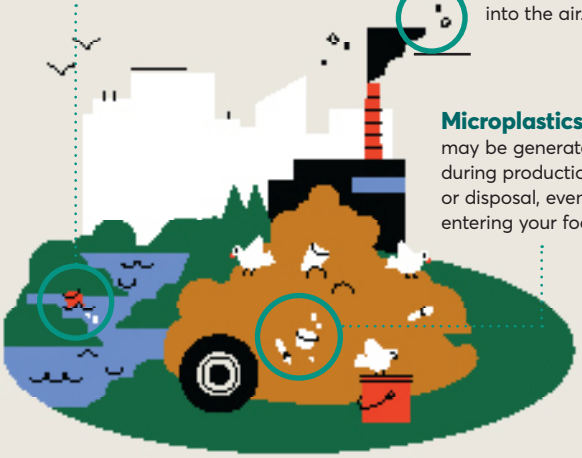
HOW PLASTIC CHEMICALS GET INTO FOOD

ENVIRONMENT

Plastic trash in landfills can degrade, allowing chemicals to leach into water and soil.

Incineration and production of plastic can release chemicals into the air.

Microplastics may be generated during production, use, or disposal, eventually entering your food.

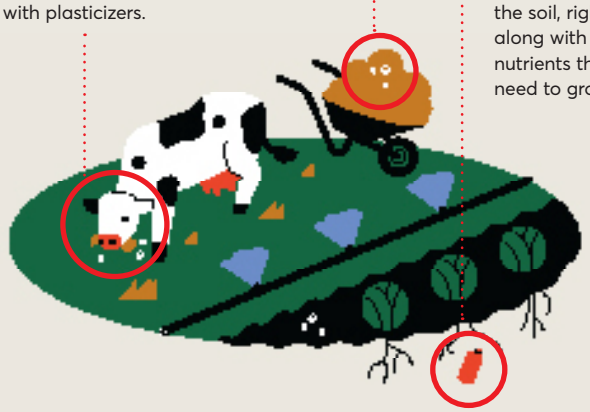


AGRICULTURE

Plastic mulch is sometimes used to suppress the growth of weeds, then plowed right into the fields.

Animals such as cows may consume water and plants contaminated with plasticizers.

Plants can drink up plasticizers from the soil, right along with the nutrients they need to grow.



Early efforts to limit exposure to them focused on packaging, but it's now clear that phthalates in particular can also get in from the plastic in the tubing, conveyor belts, and gloves used during food processing, and can even enter directly into meat and produce via contaminated water and soil.

There are few regulations restricting the use of these chemicals in food production, or requiring that manufacturers test foods for them. But our guide can help you learn how plasticizers get into your food, how to reduce your exposure, and how key changes by industry and regulators could make our food safer.

The Problem With Plastic Chemicals

Bisphenols and phthalates in our food are concerning for several reasons.

To start, growing research shows that they are endocrine disruptors, which means that they can interfere with the production and regulation of estrogen and other hormones. Even minor disruptions in hormone levels can contribute to an increased risk of several health problems, including diabetes, obesity, cardiovascular disease, certain cancers, birth defects, premature birth, neurodevelopmental disorders, and infertility.

Those problems typically develop slowly, sometimes over decades, says Philip Landrigan, MD, a pediatrician and the director of the Program for Global Public Health and the Common Good at Boston College. "Unlike a plane crash, where everyone dies at once, the people who die from these die over many years."

Another concern is that with plastic so ubiquitous in food and elsewhere, the chemicals can't be completely avoided. And though the human body is pretty good at eliminating bisphenols and phthalates from our systems, our constant exposure to them means that they enter our blood and tissue almost as quickly as they're eliminated. And plasticizers in particular can easily leach out of plastic and other materials. In addition, the chemicals' harmful effects may be cumulative, so steady exposure to even very small amounts over time could increase health risks.

All that makes it difficult to trace any particular bad health outcome—say, a heart attack or breast cancer—to the chemicals. And it makes it hard for regulators to set a limit for what is considered safe for any food. "As a first step, the key is to determine how widespread the chemicals are in our food supply," Rogers says. "Then we can develop strategies, as a society and individually, to limit our exposure."

High Risks Even at Low Levels

To help figure out the scope of the problem, CR tested a wide range of food items, in a variety of packaging.

PHOTO, PREVIOUS SPREAD: PROP STYLING BY SOPHIA PAPPAS

ILLUSTRATIONS BY THE TOM AGENCY

Specifically, we tested 85 foods, analyzing two or three samples of each. We looked for common bisphenols and phthalates, as well as some chemicals that are used to replace them. (For more information on these chemical substitutes, see "Why Chemical Substitutes May Not Be Better," on page 30.) We included prepared meals, fruits and vegetables, milk and other dairy products, baby food, fast food, meat, and seafood, all packaged in cans, pouches, foil, or other material.

The news on BPA and other bisphenols was somewhat reassuring: While we detected them in 79 percent of the tested samples, levels were notably lower than when we last tested for BPA, in 2009, "suggesting that we are at least moving in the right direction on bisphenols," says CR's Rogers.

But there wasn't any good news on phthalates: We found them in all but one food (Polar raspberry lime seltzer). And the levels were much higher than for bisphenols.

Determining an acceptable level for these chemicals in food is tricky. Regulators in the U.S. and Europe have set thresholds for only bisphenol A (BPA) and a few phthalates, and none of the foods CR tested had amounts exceeding those limits.

But "many of these thresholds do not reflect the most current scientific knowledge, and may not protect against all the potential health effects," says Tunde Akinleye, the CR scientist who oversaw CR's tests. "We don't feel comfortable saying these levels are okay," he says. "They're not."

The decision to allow these chemicals in food "is not evidence-based," says Ami Zota, ScD, an associate professor of environmental health sciences at the Columbia University Mailman School of Public Health in New York City, who has studied the risks of phthalates.

For example, one of the most well-studied phthalates is called DEHP. Studies have linked it to insulin resistance, high blood pressure, reproductive issues, early menopause, and other concerns at levels well below the limits set by American and European regulators. It was the most common phthalate that we found in our tests, with more than half of the products we tested having levels above what research has linked to health problems.

In addition, Akinleye says that with exposure to these chemicals coming from so many sources—not only food but also other products, such as printed receipts and household dust—it's difficult to quantify what a "safe" limit would be for a single food. "The more we learn about these chemicals, including how widespread they are, the more it seems clear that they can harm us even at very low levels," he says.

Making Food Safer

Growing concerns about the health risks posed by these chemicals have led U.S. regulators to meaningfully curtail the use of these chemicals in a number of products—but not yet food.

For example, the federal government has banned eight phthalates in children's toys. But—with the exception of a 2012 ban on BPA in baby bottles (extended in 2013 to infant formula cans)—there are no substantive limits on plastic-related chemicals in food packaging or production. Just last year the Food and Drug Administration rejected a petition from multiple groups calling for a ban on more than two dozen phthalates used in materials that come into contact with food.

An FDA spokesperson told CR that in 2022 it asked the food industry and others to provide the agency with additional data about the use of plasticizers in any material that comes into contact with food during production, and might use that information to update its safety assessments of the chemicals.

CR's food safety scientists and others say such a reassessment by the FDA and other agencies is overdue and essential.

Supermarket and fast-food chains, as well as food manufacturers, should also be required to take action, Rogers says, and should set specific goals for reducing and eliminating bisphenols and phthalates from all food packaging and processing equipment throughout their supply chains.

CR contacted certain companies in our tests that had products with the highest phthalate levels per serving, and asked them to comment on our results. Annie's, Burger King, Fairlife, Little Caesars, Moe's Southwest Grill, Wendy's, and Yoplait did not respond to our requests for comment.

Del Monte, Gerber, and McDonald's emphasized that they abide by existing regulations. Gerber added that it requires its suppliers to certify that its food packaging is free of BPA and phthalates. Chicken of the Sea said it requires its suppliers to certify that neither products nor packaging has intentionally added BPA or phthalates, but it acknowledged that fish live in water that is often polluted with phthalates.

More chemical companies need to step up, too, by creating safer, more sustainable materials. "We want things to be functional, but also nontoxic and biodegradable and renewable," says Hanno Erythropel, PhD, at the Center for Green Chemistry and Green Engineering at Yale University in New Haven, Conn.

That may be tough, he acknowledges, but it should be possible: An entire field called green chemistry is working to develop just these sorts of alternatives.

In the meantime, see the facing page for tips on what you can do now to limit your exposure to these chemicals in your food, and elsewhere.

Less Plastic in Your Food …

Limiting exposure to phthalates isn't as simple as avoiding particular types of packaging, because these chemicals can enter your food long before it is packaged. The best solution, says Maricel Maffini, PhD, a chemical safety expert and the author of a recent study of phthalate risks, would be for manufacturers and regulators to ensure that our food was safe, so we wouldn't "have to make these decisions when we go to the grocery store." But that doesn't mean you're powerless now. Reducing your overall exposure to the chemicals in plastic—including bisphenols and phthalates—may help you avoid some of the risks. These six steps can help.

Avoid plastic food storage containers.

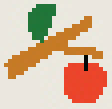
If you do use them, don't heat them in the microwave, and avoid using them to store hot food, because heat can increase leaching. You can see CR's top picks for glass and steel food storage containers at **CR.org/foodstorage**. And keep your food below the top of the container to avoid contact with the lids, which are often plastic.

Steer clear of fast foods.

Plasticizers are one more reason to limit consumption of fast food. Our testing found some of the highest levels of phthalates and phthalate substitutes in fast food. Although we can't say exactly why, one possible explanation is that fast foods are often prepared by people wearing vinyl gloves, which are known to be extremely high in these chemicals.

Limit high-fat foods.

Another reason fast foods may be high in plasticizers is that they tend to be fatty, and some research has found higher levels of plasticizers—many of which are known to be fat-soluble—in foods with higher fat content. One 2020 review, for example, reported that levels of DEHP were often almost five to 10 times higher in cream than they were in milk.

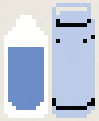


Eat fresh, minimally processed food.

Make sure your diet includes plenty of unpackaged fruits and vegetables, which have fewer chances to have contact with phthalates. A study based on 2013 to 2014 data found that people who ate more ultraprocessed foods—such as french fries and ice cream pops—had higher levels of certain phthalate byproducts in their urine.

Choose wood, stainless steel, and silicone for kitchen tools.

Chopping on a plastic cutting board can generate microplastics, so consider a wood or silicone board instead. Some plastic uses are probably riskier than others—dumping hot food into a plastic bowl and using plastic wrap for leftovers may expose you more than giving your lettuce a quick dry in a plastic salad spinner, for example.



Use water bottles made of glass or steel.

Avoid plastic bottles and cups, which are often made with bisphenols. Carrying around your own stainless steel straws can also make it easy to say no to plastic straws. As a bonus, you'll reduce the amount of trash you generate.

… And in Your World

Food is not the only way you're exposed to bisphenols and phthalates, so if you want to reduce your exposure to endocrine-disrupting chemicals, you have to think broadly. Phthalates, for example, which are a viscous liquid in their raw form, are also a common ingredient in perfumes, cleansers, shampoos, and other cosmetics, and are sometimes used in flooring and furniture. Bisphenols and phthalates are also often found in household dust. Here are a few smart steps you can take.

Go fragrance-free.

Soap, cosmetics, and cleaners with fragrances often use phthalates, especially DEP, as a solvent.

Open your windows.

Because phthalates can be used in furniture, shower curtains, and flooring, they can accumulate in household dust, which you can then inhale. "Ventilation is important," says Akhgar Ghassabian, MD, PhD, at the NYU Grossman School of Medicine. "And if you're vacuuming, make sure you do that with the window open."

Refuse paper receipts.

Go for the digital ones instead; thermal paper receipts (the ones that are a little glossy) are often coated in bisphenols.

Limit your use of vinyl.

Plasticizers are generally a key ingredient in vinyl products. When possible, choose alternate materials for shower curtains, flooring, car interiors, and clothing, says Amy Ziff, the founder of Made Safe, an organization that has partnered with CR to identify potentially harmful ingredients in products. She says vinyl is sometimes called "vegan leather."

Plastic Chemicals in Popular Foods: What Our Tests Showed

The grocery store foods and fast foods CR tested are listed in order of total phthalates per serving. While there is no level that scientists have confirmed as safe, lower levels are better. Our results show that although the chemicals are widespread in our food, levels can vary dramatically even among similar products, so in some cases you may be able to use our chart to choose products with lower levels. (Not all tested foods are shown in this chart.)

BEVERAGES	TOTAL PHTHALATES PER SERVING (NANOGRAMS)*
Lipton Brisk Lemonade *(can)*	7,467
Coca-Cola Original *(plastic)*	6,167
Lipton Diet Green Tea Citrus *(plastic)*	4,433
Poland Spring 100% Natural Spring Water *(plastic)*	4,217
Juicy Juice 100% Juice Apple *(plastic)*	3,348
Pepsi Cola *(can)*	2,938
Juicy Juice 100% Juice Apple *(cardboard box)*	2,260
Gatorade Frost Thirst Quencher Glacier Freeze *(plastic)*	1,752
Polar Seltzer Raspberry Lime *(can)*	0

*Includes the 10 phthalates we tested for: BBP, DBP, DiBP, DCHP, DEP, DEHP, DnHP, DMP, DiNP, and DNOP. We also tested for three chemicals used as phthalate substitutes (DEHA, DEHT, and DINCH), and three bisphenols (BPA, BPS, and BPF), which are not shown in this chart.

CANNED BEANS	TOTAL PHTHALATES PER SERVING (NANOGRAMS)*
Hormel Chili With Beans *(can)*	9,847
Bush's Chili Red Beans Mild Chili Sauce *(can)*	6,405
Great Value (Walmart) Baked Beans Original *(can)*	6,184
Bush's Baked Beans Original *(can)*	3,709

CONDIMENTS	
Mrs. Butterworth's Syrup Original *(plastic)*	1,010
Hunt's Tomato Ketchup *(can)*	574
Sweet Baby Ray's Barbecue Sauce Original *(plastic)*	22

DAIRY	
Fairlife Core Power High Protein Milk Shake Chocolate *(plastic)*	20,452
SlimFast High Protein Meal Replacement Shake Creamy Chocolate *(plastic)*	16,916

DAIRY *continued*	TOTAL PHTHALATES PER SERVING (NANOGRAMS)*
Yoplait Original Low Fat Yogurt French Vanilla *(plastic)*	10,948
Tuscan Dairy Farms Whole Milk *(plastic)*	10,932
Ben & Jerry's Ice Cream Vanilla *(paperboard carton)*	6,387
Wholesome Pantry (ShopRite) Organic Whole Milk *(carton)*	4,620
Great Value (Walmart) Ice Cream Homestyle Vanilla *(plastic)*	3,068
Jell-O Pudding Snacks Original Chocolate *(plastic)*	1,756
Sargento Sliced Natural Cheddar Cheese Sharp *(plastic)*	1,481
Land O'Lakes Butter Salted *(paper wrap/cardboard)*	581

FAST FOOD	
Wendy's Crispy Chicken Nuggets *(paperboard)*	33,980
Moe's Southwest Grill Chicken Burrito *(aluminum foil)*	24,330
Chipotle Chicken Burrito *(aluminum foil)*	20,579
Burger King Whopper With Cheese *(paper)*	20,167
Burger King Chicken Nuggets *(paper bag)*	19,782
Wendy's Dave's Single With Cheese *(aluminum foil/paper wrap)*	19,520
McDonald's Quarter Pounder With Cheese *(cardboard)*	9,956
Wendy's Natural-Cut French Fries *(paperboard)*	8,876
Burger King Classic French Fries *(paperboard)*	8,512

WHY CHEMICAL SUBSTITUTES MAY NOT BE BETTER

WHILE CR FOUND high levels of phthalates in many foods, we found even higher levels of several chemicals that have been developed to replace those phthalates. Researchers say that although little is known about these substitutes, some may pose similar risks. This phenomenon—industry replacing a dangerous chemical with a newer one that might not be any safer—is so common that it has its own name: regrettable substitution.

In our tests, we found both phthalates and their replacements in many products, with the alternatives often at much higher concentrations. That was especially true for fast foods. For example, a chicken burrito with rice and beans from Moe's Southwest Grill had 48 parts per billion (ppb) total phthalates—and 15,351 ppb phthalate substitutes. That's 320 times as much.

Environmental health experts have seen this scenario play out before. It happened when research about the risks of BPA led to public outcry that prompted manufacturers to replace it with similar chemicals like BPS and BPF, while declaring their products "BPA free." It's happening now with phthalates, as growing awareness of their potential harms have led to increased use of alternative plasticizers.

"When a spotlight is shined on a particular phthalate or bisphenol, the manufacturer quickly moves on to a first cousin chemical," says Philip Landrigan, MD, of Boston College. "Oftentimes we have little or no information on the substitute,

FAST FOOD *continued*	TOTAL PHTHALATES PER SERVING (NANOGRAMS)*
McDonald's Chicken McNuggets *(cardboard)*	8,030
Little Caesars Classic Cheese Pizza *(cardboard box)*	5,703
McDonald's French Fries *(paperboard)*	5,538
McDonald's Quarter Pounder Hamburger Patty *(varied)*	5,428
Taco Bell Chicken Burrito *(paper wrap)*	4,720
Domino's Hand Tossed Cheese Pizza *(cardboard box)*	4,356
Wendy's Dave's Single Hamburger Patty *(varied)*	3,629
Burger King Whopper Hamburger Patty *(varied)*	2,870
Pizza Hut Original Cheese Pan Pizza *(cardboard box)*	2,718

GRAINS

General Mills Cheerios Original *(paper/cardboard)*	10,980
Success 10 Minute Boil-in-Bag White Rice *(paper/cardboard)*	4,308
Pepperidge Farm Farmhouse Hearty White Bread *(plastic bag)*	2,184

INFANT FOOD

Gerber Mealtime for Baby Harvest Turkey Dinner *(glass with lined lid)*	4,267
Similac Advance Infant Milk-Based Powder Formula *(can)*	4,202
Beech-Nut Fruities Pouch Pear, Banana & Raspberries *(pouch)*	2,826
Gerber Cereal for Baby Rice *(plastic)*	1,599
Happy Baby Organics Clearly Crafted Banana & Strawberries *(glass with lined lid)*	1,300

INFANT FOOD *continued*	TOTAL PHTHALATES PER SERVING (NANOGRAMS)*
Happy Baby Organic Milk-Based Infant Powder Formula With Iron *(plastic)*	977
Gerber Organic for Baby Pouch Apple Zucchini Spinach Strawberry *(pouch)*	706

MEAT AND POULTRY

Perdue Ground Chicken Breast *(foam tray with plastic wrap)*	9,985
Trader Joe's Ground Pork 80% Lean 20% Fat *(foam tray with plastic wrap)*	5,503
Premio Foods Sweet Italian Sausage *(foam tray with plastic wrap)*	4,725
Libby's Corned Beef *(can)*	4,088
Bar S Chicken Jumbo Franks *(plastic)*	3,295
Stop & Shop Ground Beef 80% Lean 20% Fat *(paperboard with plastic wrap)*	2,729
Applegate Naturals Oven Roasted Turkey Breast *(plastic)*	2,295
Swanson White Premium Chunk Chicken Breast *(can)*	1,376
Johnsonville Smoked Sausage Beef Hot Links *(plastic)*	912

PACKAGED FRUITS AND VEGETABLES

Del Monte Sliced Peaches in 100% Fruit Juice *(can)*	24,928
Green Giant Cream Style Sweet Corn *(can)*	7,603
Del Monte Fresh Cut Italian Green Beans *(can)*	5,264

PACKAGED FRUITS AND VEGETABLES *continued*	TOTAL PHTHALATES PER SERVING (NANOGRAMS)*
Progresso Vegetable Classics Vegetable Soup *(can)*	2,888
Birds Eye Steam Fresh Cut Green Beans *(plastic bag)*	907
Hunt's Tomato Sauce *(can)*	680

PREPARED MEALS

Annie's Organic Cheesy Ravioli *(can)*	53,579
Chef Boyardee Beefaroni Pasta in Tomato and Meat Sauce *(can)*	13,628
Banquet Chicken Pot Pie *(plastic/paperboard)*	12,494
Campbell's Chunky Classic Chicken Noodle Soup *(plastic)*	6,768
Chef Boyardee Big Bowl Beefaroni Pasta in Meat Sauce *(plastic)*	5,064
Campbell's Chicken Noodle Soup *(can)*	2,848
Red Baron Brick Oven Cheese-Trio Pizza *(paperboard)*	1,707

SEAFOOD

Chicken of the Sea Pink Salmon in Water Skinless Boneless *(can)*	24,321
King Oscar Wild Caught Sardines in Extra Virgin Olive Oil *(can)*	7,792
Snow's Chopped Clams *(can)*	4,380
StarKist Wild Caught Light Tuna in Water *(pouch)*	1,735
StarKist Chunk Light Tuna in Water *(can)*	1,687
Season Brand Sardines in Water Skinless & Boneless *(can)*	1,258

and this speaks to a much bigger problem: Chemicals are allowed to come on the market in this country with almost no premarket safety testing."

That gap is why safety advocates say regulators should apply the "precautionary principle" when new, related chemicals come on the market, and assume them to be unsafe until proven otherwise. And they say that chemicals should be regulated as classes rather than individually. "Otherwise, regulators are just playing whack-a-mole as they try to keep up as industry creates new, potentially toxic chemicals, without adequate testing," says Michael Hansen, PhD, a senior scientist at CR. "We need to get ahead of the problem, not play catch-up."

—Lauren Kirchner

Moe's Southwest Grill chicken burrito has very high levels of phthalate substitutes, which may be as harmful as the chemicals they replace.

PHOTO: SCOTT MEADOWS/CONSUMER REPORTS