



Bottled Water Pure Drink or Pure Hype?

EXECUTIVE SUMMARY

More than half of all Americans drink bottled water; about a third of the public consumes it regularly. Sales have tripled in the past 10 years, to about \$4 billion a year. This sales bonanza has been fueled by ubiquitous ads picturing towering mountains, pristine glaciers, and crystal-clear springs nestled in untouched forests yielding absolutely pure water. But is the marketing image of total purity accurate? Also, are rules for bottled water stricter than those for tap water?

Not exactly. No one should assume that just because he or she purchases water in a bottle that it is necessarily any better regulated, purer, or safer than most tap water. NRDC has completed a four-year study of the bottled water industry, including its bacterial and chemical contamination problems. We have conducted a review of available information on bottled water and its sources, an in-depth assessment of Food and Drug Administration (FDA) and all 50 states' programs governing bottled water safety, and an analysis of government and academic bottled water testing results. We have compared FDA's bottled water rules with certain international bottled water standards and with the U.S. Environmental Protection Agency (EPA) rules that apply to piped tap water supplied by public water systems. In addition, NRDC commissioned independent lab testing of more than 1,000 bottles of 103 types of bottled water from many parts of the country (California, the District of Columbia, Florida, Illinois, New York, and Texas). Our conclusions and recommendations follow.

An Exploding Bottled Water Market

- There has been an explosion in bottled water use in the United States, driven in large measure by marketing designed to convince the public of bottled water's purity and safety, and capitalizing on public concern about tap water quality. People spend from 240 to over 10,000 times more per gallon for bottled water than they typically do for tap water.
- Some of this marketing is misleading, implying the water comes from pristine sources when it does not. For example, one brand of "spring water" whose label pictured a lake and mountains, actually came from a well in an industrial facility's parking lot, near a hazardous waste dump, and periodically was contaminated with industrial chemicals at levels above FDA standards.
- According to government and industry estimates, about one fourth of bottled water is bottled tap water (and by some accounts, as much as 40 percent is derived from tap water) -- sometimes with additional treatment, sometimes not.

Major Regulatory Gaps

- FDA's rules completely exempt 60-70 percent of the bottled water sold in the United States from the agency's bottled water standards, because FDA says its rules do not apply to water packaged and sold within the same state. Nearly 40 states say they do regulate such waters (generally with few or no resources dedicated to policing this); therefore, about one out of five states do not.
- FDA also exempts "carbonated water," "seltzer," and many other waters sold in bottles from its bottled water standards, applying only vague general sanitation rules that set no specific contamination limits. Fewer than half of the states require these waters to meet bottled water standards.
- Even when bottled waters are covered by FDA's specific bottled water standards, those rules are weaker in many ways than EPA rules that apply to big city tap water. For instance, comparing those EPA regulations (for water systems which serve the majority of the U.S. population) with FDA's bottled water rules:
 - City tap water can have no confirmed *E. coli* or fecal coliform bacteria (bacteria that are indications of possible contamination by fecal matter). FDA bottled water rules include no such prohibition (a certain amount of any type of coliform bacteria is allowed in bottled water).
 - City tap water from surface water must be filtered and disinfected (or the water system must adopt well-defined protective measures for the source water it uses, such as control of potentially polluting activities that may affect the stream involved). In contrast, there are no federal filtration or disinfection requirements for bottled water -- the only source-water protection, filtration, or disinfection provisions for bottled water are completely delegated to state discretion, and many states have adopted no such meaningful programs.
 - Bottled water plants must test for coliform bacteria just once a week; big-city tap water must be tested 100 or more times a month.
 - Repeated high levels of bacteria (i.e., "heterotrophic-plate-count" bacteria) in tap water combined with a lack of disinfectant can trigger a violation for cities -- but not for water bottlers.
 - Most cities using surface water have had to test for *Cryptosporidium* or *Giardia*, two common water pathogens that can cause diarrhea and other intestinal problems (or more serious problems in vulnerable people), yet bottled water companies don't have to do this.
 - City tap water must meet standards for certain important toxic or cancer-causing chemicals such as phthalate (a chemical that can leach from plastic, including plastic bottles); some in the industry persuaded FDA to exempt bottled water from regulations regarding these chemicals.
 - Any violation of tap-water standards is grounds for enforcement -- but bottled water in violation of standards can still be sold if it is labeled as "containing excessive chemicals" or "excessive bacteria" (unless FDA finds it "adulterated," a term not specifically defined).

- Cities generally must test at least once a quarter for many chemical contaminants. Water bottlers generally must test only annually.
 - Cities must have their water tested by government-certified labs; such certified testing is not required for bottlers.
 - Tap water test results and notices of violations must be reported to state or federal officials. There is no mandatory reporting for water bottlers.
 - City water system operators must be certified and trained to ensure that they know how to safely treat and deliver water -- not so for bottlers.
 - City water systems must issue annual "right-to-know" reports telling consumers what is in their water; as detailed in this report, bottlers successfully killed such a requirement for bottled water.
- FDA and state bottled water programs are seriously underfunded. FDA says bottled water is a low priority; the agency estimates it has the equivalent of *fewer than one* staff person dedicated to developing and issuing bottled water rules, and the equivalent of *fewer than one* FDA staffer assuring compliance with the bottled water rules on the books. Although a small number of states (such as California) have real bottled water programs, our 1998 survey found that 43 states have fewer than one staff person dedicated to bottled water regulation. By comparison, hundreds of federal staff and many more state personnel are dedicated to tap water regulation. Directing disproportionate resources to tap water protection is warranted. At the same time, over half the U.S. public (including many immunocompromised people) uses bottled water, and many millions of people use bottled water as their chief or exclusive drinking water source.
 - FDA's regulations are less stringent than some international standards. For example, unlike FDA's rules, the European Union's (EU's) bottled natural mineral water standards regulate total bacteria count, and explicitly ban all parasites and pathogenic microorganisms, *E. coli* or other coliform bacteria, fecal streptococci (e.g., *Streptococcus faecalis*, recently renamed *Enterococcus faecalis*), *Pseudomonas aeruginosa*, and sporulated sulphite-reducing anaerobic bacteria. Moreover, unlike the weaker FDA rules, the EU rules require natural mineral bottled water's labels to state the composition of the water and the specific water source, and mandate that only one water label may be used per source of water. Similarly, recent EU standards applicable to all bottled water also are far stricter than FDA standards. FDA's standards for certain chemicals (such as arsenic) also are weaker than certain World Health Organization (WHO) guidelines.

Bottled Water: As Pure as We Are Led to Believe?

- While most bottled water apparently is of good quality, publicly available monitoring data are scarce. The underfunded and haphazard patchwork of regulatory programs has found numerous cases where bottled water has been contaminated at levels above state or federal standards. In some cases bottled water has been recalled.
- Our "snapshot" testing of more than 1,000 bottles of 103 brands of water by three independent labs found that most bottled water tested was of good quality, but some brands' quality was spotty. About one third of the bottled waters we tested contained

significant contamination (i.e., levels of chemical or bacterial contaminants exceeding those allowed under a state or industry standard or guideline) in at least one test. This is the most comprehensive independent testing of bottled water in the United States that is publicly available. Moreover, NRDC contracted with an independent data verification firm to confirm the accuracy of our positive test results. Still, the testing was limited. The labs tested most waters for about half of the drinking water contaminants regulated by FDA (to control costs). They found:

- Nearly one in four of the waters tested (23 of the 103 waters, or 22 percent) violated strict applicable state (California) limits for bottled water in at least one sample, most commonly for arsenic or certain cancer-causing man-made ("synthetic") organic compounds. Another three waters sold outside of California (3 percent of the national total) violated industry-recommended standards for synthetic organic compounds in at least one sample, but unlike in California, those industry standards were not enforceable in the states (Florida and Texas) in which they were sold.
- Nearly one in five tested waters (18 of the 103, or 17 percent) contained, in at least one sample, more bacteria than allowed under microbiological-purity "guidelines" (unenforceable sanitation guidelines based on heterotrophic plate count [HPC] bacteria levels in the water) adopted by some states, the industry, and the EU. The U.S. bottled water industry uses HPC guidelines, and there are European HPC standards applicable overseas to certain bottled waters, but there are no U.S. standards in light of strong bottler opposition to making such limits legally binding.
- In sum, approximately one third of the tested waters (34 of 103 waters, or 33 percent) violated an enforceable state standard or exceeded microbiological-purity guidelines, or both, in at least one sample. We were unable to test for many microbial contaminants, such as *Cryptosporidium*, because the logistics and cost of testing for them post-bottling were beyond our means.
- Four waters (4 percent) violated the generally weak federal bottled water standards (two for excessive fluoride and two for excessive coliform bacteria; neither of the two latter waters were found to be contaminated with coliform bacteria in our testing of a different lot of the same brand).
- About one fifth of the waters contained synthetic organic chemicals -- such as industrial chemicals (e.g., toluene or xylene) or chemicals used in manufacturing plastic (e.g., phthalate, adipate, or styrene) -- in at least one sample, but generally at levels below state and federal standards. One sample contained phthalate -- a carcinogen that leaches from plastic -- at a level twice the tap water standard, but there is no bottled water standard for this chemical; two other samples from different batches of this same water contained no detectable phthalate.
- In addition, many waters contained arsenic, nitrates, or other inorganic contaminants at levels below current standards. While in most cases the levels found were not surprising, in eight cases arsenic was found in at least one test at a level of potential health concern.
- For purposes of comparison, we note that EPA recently reported that in 1996 about 1 in 10 community tap water systems (serving about one seventh of the U.S. population) violated EPA's tap water treatment or contaminant standards, and 28

percent of tap water systems violated significant water-monitoring or reporting requirements. In addition, the tap water of more than 32 million Americans (and perhaps more) exceeds 2 parts per billion (ppb) arsenic (the California Proposition 65 warning level, applicable to bottled water, is 5 ppb); and 80 to 100 million Americans drink tap water that contains very significant trihalomethane levels (over 40 ppb). Thus, while much tap water is supplied by systems that have violated EPA standards or that serve water containing substantial levels of risky contaminants, apparently the majority of the country's tap water passes EPA standards. Therefore, while much tap water is indeed risky, having compared available data we conclude that there is no assurance that bottled water is any safer than tap water.

- Other academic and government bottled water surveys generally are consistent with the testing NRDC commissioned. Though usually limited in scope, these studies also have found that most bottled water meets applicable enforceable standards, but that a minority of waters contain chemical or microbiological contaminants of potential concern.

Recommendations

Every American has a right to safe, good-tasting water from the tap. If we choose to buy bottled water, we deserve assurances that it too is safe. In addition, whether our water comes from a tap or a bottle, we have a right to know what's in it. Among our key recommendations are:

- FDA should set strict limits (equivalent to those in California, EPA rules, international standards, or industry guidelines, whichever is most health protective) for contaminants of concern in bottled water, including arsenic, heterotrophic-plate-count bacteria, *E. coli* and other parasites and pathogens, *Pseudomonas aeruginosa*, and synthetic organic chemicals, including chemicals such as phthalate, which can leach from plastic.
- FDA's rules should be overhauled and should apply to all bottled water distributed nationally or within a state, carbonated or not. To comply with common sense and a new requirement tucked into the 1996 Safe Drinking Water Act Amendments, FDA standards must be made at least as strict as those applicable to city tap water supplies. The FDA should adopt rules for bottled water testing, to control microbial and chemical contaminants, to protect water sources, to ensure the reporting of test results and violations to state and federal officials, to train and certify operators of water bottling plants, and to require the use of certified labs. In addition, FDA should do its own audits and monitoring of the quality of bottled water sold across the nation and should publicly release the results.
- Right-to-know requirements should require water-bottle labels to disclose contaminants, the exact water source, treatment, and other key information, as is now required of tap water systems. If bottled water is so pure, why not prove it with full disclosure on the label?
- FDA's bottled water program and state programs must be better funded, with a new penny-per-bottle fee on bottled water to fund regulatory programs, testing, and enforcement.

- State bottled water programs should be subject to federal review and approval, and should receive federal funding from the penny-per-bottle fee recommended above.
- If FDA fails within 18 months to make its bottled water rules and its regulatory oversight and enforcement at least as stringent as those for tap water, the bottled water regulatory program and funding for it (including the proceeds from a penny-per-bottle fee) should be transferred to EPA. We recommend this transfer with some trepidation, in light of EPA's less-than-perfect tap water program and its own serious resource constraints. We conclude, however, that it would be hard for EPA authority to be worse than FDA's seriously deficient program, and that a transfer of funding for bottled water supervision to EPA from FDA would help. Clearly EPA has more resources dedicated to drinking water and has adopted stricter rules and oversight of state programs than FDA has. More stringent EPA tap water rules should be applied to bottled water within six months after transfer of authority.
- A credible independent third-party nongovernmental organization should establish a "certified safe" bottled water program that is truly open, ensures full compliance with all FDA, EPA, state, industry, and international standards and guidelines, does twice-a-year surprise inspections, documents sufficient source protection and treatment to meet EPA/Centers for Disease Control and Prevention (CDC) criteria for *Cryptosporidium*-safe bottled water, and makes readily available (including on the Web) all inspections and monitoring results. Currently neither NSF nor International Bottled Water Association certifications have sufficiently stringent criteria, nor are they sufficiently independent of the industry, to provide consumer confidence that such strict standards are met. Immune-compromised or other vulnerable people particularly may want such certification to be fully confident of their bottled water's purity.
- While we reasonably may choose to use bottled water for convenience, taste, or as a temporary alternative to contaminated tap water, it is no long-term national solution to this problem. Bottled water sometimes is contaminated, and we don't use it to bathe, shower, etc. -- major routes of exposure for some tap water contaminants. A major shift to bottled water could undermine funding for tap water protection, raising serious equity issues for the poor. Manufacture and shipping of billions of bottles causes unnecessary energy and petroleum consumption, leads to landfilling or incineration of bottles, and can release environmental toxins. The long-term solution to our water woes is to fix our tap water so it is safe for everyone, and tastes and smells good.