

ENCOURAGING VIRGINIANS TO WIN WITH TAP WATER





What is at stake

Water is the healthiest drink for children and adults, and it is also one of the simplest and least expensive ways to maintain and promote health.

Water is the healthiest drink for children and adults, and it is also one of the simplest and least expensive ways to maintain and promote health. Drinking fluoridated tap water keeps our body functioning efficiently; leads us to consume fewer empty calories, prevents dental cavities and preserves the environment. Fluoridated tap water should be the primary drink of Virginians. Of note:

- Getting more Virginians to make water their “go to” beverage will reduce consumption of sugary drinks. This is crucial because sugary drinks are the single largest source of added sugar in the U.S. diet[1] and contribute to obesity, which affects roughly 1 in 8 Virginia high school students.[2] Research shows that a person drinking two or more sugary drinks daily has a 21 percent higher risk of early death from heart disease or other causes.[3]
- Increasing exposure to fluoride through water will reduce tooth decay. In Virginia, 96 percent of residents have access to tap water that is fluoridated one of the highest rates in the nation. The Virginia Oral Health Report Card gives the state an ‘A’ in this category.

Yet,

- A recent survey shows that 58 percent of U.S. adults drink water only “some of the time,” rarely or never with meals at home. And only four in 10 adults make tap water their usual choice for water - meaning many of them are not getting the benefits of drinking fluoridated water. [4]

A variety of factors steer people away from tap water and toward unhealthy beverages. Sugary drinks are promoted to the public in costly, sophisticated campaigns. In 2017, the Coca-Cola Company spent an average of more than \$1 million each day to advertise its signature soda in the United States.[5] That’s more money than Norfolk spends per day to operate its water utility, which is the second-largest system in Virginia.[6] To keep costs lower for their customers, public water systems across the U.S. generally spend little or no money for marketing or advertising.[7]

Consumers’ choices may be driven by the misperception that bottled water is safer than tap water, and equally healthy. And notably, the water crisis in Flint, Michigan and other events are likely affecting the trust that Americans have in their tap water. One recent survey of U.S. adults found that 36 percent of them question whether the tap water at home “is clean and safe.”[8]

Promoting tap water consumption in the Commonwealth has the potential to positively impact health throughout a person’s lifetime, starting with childhood. Sugary drinks and other sources of sugar are key drivers of various chronic diseases, including tooth decay and diabetes and a large contributor to obesity. Tooth decay is the most common chronic disease of children and teens, and nearly half of Virginia’s third graders have experienced a cavity.

Adults also stand to benefit by making water their primary beverage. Half of all middle-aged Virginians have lost at least one tooth due to tooth decay or gum disease.[9] In Virginia, 1 in 8 adults has diabetes, and 2.2 million adults have prediabetes—meaning they have above-normal blood sugar levels that could be diagnosed later as diabetes.[10] Encouraging more Virginians to drink fluoridated water could help keep many of them from having diabetes or dental decay now, or in the future.

Fortunately, we don’t have to start from scratch. There are existing initiatives in Virginia that health professionals and advocates can build on to promote tap water as the healthiest drink option. This issue brief explores the challenges we face in promoting water, identifying strategies that can advance this goal.

96% of Virginians have access to fluoridated tap water



Soda Isn't the Only Concern

Sugary drinks include soda and other beverages with added sugar. Most adults know that soda has a high-sugar content, but people may be less aware that sports and energy drinks, and fruit juices—even 100 percent natural fruit juice—contain a lot of sugar.[11]

Several factors shape this knowledge gap. Teens and adults can get the wrong message from viewing a TV ad in which a well-known star athlete consumes a sports drink or talks positively about it. These ads don't disclose that a 20-ounce bottle of a popular sports drink contains 34 grams of sugar, which is more than eight teaspoons.[12]

Sports drinks are promoted as a way to enhance athletic performance and recovery. Although these drinks can help someone's body recover from intense exercise, many teens who consume sports drinks are not doing so soon after vigorous athletic activities. In fact, one survey found that 90 percent of teens consumed sports drinks mainly because they had a "nice taste." In addition, 51 percent of teen girls reported drinking them socially.[13]

Like sports drinks, energy drinks also have plenty of sugar. A typical eight-ounce serving of energy drinks contains at least six teaspoons of sugar.[14] Because energy drinks have been marketed to teens and young adults, it's worrisome that some of these beverages have as much caffeine as a cup of coffee.[15] A study published this year revealed that energy drinks can alter a person's heart rhythm and raise blood pressure.[16]

The American Academy of Pediatrics (AAP) advises parents and caregivers not to serve energy drinks to children, and the AAP discourages sports drinks, noting that "some of these products contain substances that could be harmful to children." Dr. Helen Ragazzi, a pediatrician and Virginia-AAP leader, added, "For most children engaging in routine physical activity, plain water is best." [17]

Neither children nor adults should consume sports and energy drinks regularly. Water is the no-calorie, no-sugar drink that can keep Virginians adequately hydrated and reduce their risk of diabetes, tooth decay, obesity and other chronic diseases.

"For most children engaging in routine physical activity, plain water is best" - Dr. Helen Ragazzi, Virginia-AAP leader, pediatrician





The Importance of Fluoridated Water

Fluoride is a mineral that protects teeth from decay, both for children and adults. Fluoride occurs naturally in all water supplies, but the level is usually too low to prevent tooth decay. For this reason, more than 350 public water systems in Virginia add fluoride. More than 6 million residents of our state have access to water with fluoride at the optimal level (0.7 milligrams per liter) recommended by federal health officials.[18] Among Virginians whose homes are served by a public water system, 96 percent have access to water that is fluoridated.[19] This percentage far exceeds the Healthy People 2020 goal that federal health officials set and is the reason Virginia receives an A in water fluoridation in the Virginia Oral Health Report Card.[20]



Fluoride in the water prevents cavities both systemically and topically. Fluoride that is swallowed enters the bloodstream and combines with calcium and phosphate as the tooth is formed under the gums, which makes teeth more resistant to decay. Additionally, when the tooth enamel is exposed to low levels of fluoride throughout the day teeth are further protected from decay. Water fluoridation reduces tooth decay by 25 percent.[21] When a local water system adjusts its fluoride to the optimal level, this process is called community water fluoridation (CWF). (For Virginians who rely on well water, fluoride concentrations can vary widely; these residents should get their water tested so they know its fluoride level.)

Using toothpaste with fluoride is also very important. Brushing with fluoride toothpaste at least twice each day complements the benefits of CWF. Fluoride varnish, fluoride mouth rinses and other fluoride products also offer benefits.[22]

CWF is the most cost-effective way to provide fluoride to an entire community. This is why health equity advocates support CWF. Dr. David Satcher, a former U.S. Surgeon General, called CWF a crucial strategy for closing oral health disparities. "A significant advantage of water fluoridation is that anyone, regardless of socioeconomic level, can enjoy these health benefits during their daily lives—at home, work, or at school or play—simply by drinking fluoridated water or beverages prepared with fluoridated water," Dr. Satcher wrote.[23]



Preserving Water Fluoridation

We cannot take CWF for granted in Virginia. A recent article in the Journal of the American Medical Association pointed to “torrents of misinformation” about fluoridation and other public health topics that circulate online and in social media.[24] It can be tough for consumers to distinguish false claims from accurate information. Misinformation can prompt some well-intentioned people to ask their local water systems to cease CWF.

In recent years, this has happened in several communities across the Commonwealth. In 2018, Virginia Health Catalyst worked closely with the Virginia Department of Health to engage our partners in Spotsylvania County, where the board of supervisors was urged to end CWF. Fortunately, this engagement helped to educate local officials and led to a 4-3 vote for continuing CWF.[25]

Although the outcome was positive, the narrow vote and the potential for challenges in other areas of the Commonwealth led Virginia Health Catalyst to launch its Rapid Response Team (RRT) in partnership with the Virginia Department of Health and the Virginia Dental Association. This is a network of advocates who are ready to respond quickly when threats to CWF arise in their communities. When fluoridation policies are challenged in Virginia, RRT members are ready to educate local leaders by sharing recent research showing that tooth decay rises after a community ceases CWF. Health professionals and advocates should become familiar with these studies.

The impact of removing water fluoridation

A 2018 study found that after CWF ceased in Alaska’s capital city, the average preschool-age child needed one additional decay-related procedure each year at a cost of about \$300.[26] After the Canadian city of Calgary ended CWF, the average decay rate for second-graders soared 146 percent—a much higher change than the cavity trend for a fluoridated city in the same province.[27]



Promoting Tap over Bottled Water

Although bottled water is certainly much healthier than sugary drinks, tap water should be encouraged over bottled water. As noted previously, the vast majority of public water systems in our state provide water that is fluoridated; most brands of bottled water lack sufficient fluoride. Additionally, there are other reasons why Virginians should embrace tap over bottled water:



Safety: While there is a perception that bottled water is safer than tap water, the facts show otherwise.[28] The Safe Drinking Water Act applies to public water systems but does not apply to bottled water.[29] In addition, tap water is tested more frequently than bottled water.[30] A recent report by the World Wildlife Fund International pointed out that “there are more standards regulating tap water in Europe and the United States than those applied to the bottled water industry.”[31]

Acidity: In addition to the typical lack of fluoride, some brands of bottled water have a pH level that could raise a person’s risk of tooth decay. The pH scale ranges from zero to 14, and seven is neutral. Anything below seven is acidic and anything above it is alkaline. The pH score matters because acidic drinks can demineralize teeth, breaking down the enamel layer and opening the door to cavities.[32] Tap water typically has a pH of about seven, which is not acidic. By contrast, a 2015 study revealed that seven of the nine bottled waters that were tested had a pH level that was acidic.[33]

Family Budgets: The average per-gallon cost of bottled water is about 300 times higher than the cost of tap water.[34] Even small savings can be helpful to Virginian families that are living from paycheck to paycheck. If families were aware of the big cost difference, and felt confident in the safety of their tap water, they might reconsider whether bottled water is worth the added expense.

Marketing Tactics: The bottled water industry has targeted lower-income groups, people of color and immigrant communities. According to one watchdog group, marketing efforts are directed to people “who historically have lacked access to safe tap water (especially recent immigrants)” and others who may have cultural or other reasons for mistrusting tap water.[35]

The Environment: The plastic left behind after bottled water is consumed creates a major environmental impact. It takes at least 450 years before plastic decomposes, and only 9 percent of all plastic waste ever produced has been recycled.[36] Drinking tap water doesn’t have this impact, and people can use a reusable water bottle to take tap water to and from school, work or other destinations.

Transparency: Many Virginians may not know that most bottled water comes from tap water—not from a spring or other exclusive source. Aquafina, for example, is tap water that simply went through an additional filtering process.[37]



Ensuring Safe, High-Quality Water

The water crisis that occurred in Flint, Michigan is unforgivable. Thousands of children were exposed to high levels of lead because the officials managing their city neglected to ensure that appropriate safety precautions were taken when they switched to a new water supply.[38]

Virginia Health Catalyst is committed to working with state officials and its partners to take proactive steps to reassure the public about drinking water. The Flint crisis drew national interest and may have weakened the confidence that some Virginians have in their local tap water.[39] Even if the water that leaves a treatment facility is safe, old pipes and degraded water fountains can make water in schools and other buildings appear cloudy or emit an unpleasant odor—discouraging people from drinking it. The taste of tap water can be affected by a variety of factors, including the mineral content, which can lead to mistrust in the safety of the water.

70

Water samples tested by
Newport News
Waterworks over three
years to ensure water is
complying with federal
rules.

Every resident in the Commonwealth, regardless of their zip code, deserves access to safe, high-quality drinking water. Fortunately, the typical water system in our state does an admirable job of providing safe water. Public water systems take rigorous steps to monitor quality. Over a three-year period, the Newport News Waterworks tested more than 70 water samples at its treatment plants to confirm that it was complying with federal rules about lead and copper.[40]

Public water systems are required to regularly test their water quality and share a Consumer Confidence Report (CCR) each year with their customers. This report informs customers whether their water system has any contaminants that exceed the limits or standards set by law. Health professionals and advocates should review their local CCR annually and should contact water department officials if they have any questions or concerns.

Because water quality is affected by water infrastructure, this is another key area where state officials should assist local efforts by supporting the repair or replacement of aging equipment in many of Virginia's 2,830 public water systems. In its 50-state report card, the American Society of Civil Engineers (ASCE) gave the Commonwealth a 'C' for the condition of its drinking water infrastructure. As ASCE warned, continued deferral of repairs in Virginia could lead to "degraded water service, water quality violations, health issues, and higher costs in the future." [41] The need to upgrade infrastructure is significant and often has spillover costs. In Norfolk, the replacement of old water lines required the city's budget to set aside \$8.5 million because curbs and sidewalks also will need to be restored.[42]

State grants or other creative funding strategies could help local water systems make vital infrastructure upgrades without forcing their customers to take on all of the costs. This kind of assistance could lessen the inequities that exist in consumer water bills. For example, residents of the city of Richmond pay \$93 per month, while customers in Henrico County pay only \$60.[43]

\$33

Amount Richmond city
residents pay more
than Henrico residents
for water



Strategies for success

Virginia Health Catalyst looks forward to working with its partners (and identifying new ones) to promote tap water for better health. Catalyst views the following strategies as crucial in encouraging more Virginians to make water their “go to” beverage:

Start by making changes where you are:

- *Serve tap water at internal and external meetings.* To facilitate this, pour tap water into pitchers that keep in a refrigerator so they are chilled and ready to be serve.
- *Make tap water accessible* through water-refill stations, access to refillable cups or recyclable paper cups.
- *Tell people why you are making these changes.* This will raise their awareness.

Encourage healthy drink habits at home:

- *Remind your children to consume water throughout the day.* Adults should model good behavior by drinking fluoridated water. Make it more fun for children by encouraging their creativity, letting them choose berries or another type of fruit to add to a glass or pitcher of water.

Promote fluoridated water during patient or family interactions:

- *Ask patients or families what beverage they drink the most.* If it is bottled water, let them know that tap water in Virginia typically has the added benefits of fluoride. These patient encounters are a good one-on-one opportunity to dispel myths, including the assumption that bottled water is fluoridated.
- *Include water promotion in your talks or presentations.* This should be a two-way dialogue, recognizing that some people may be homeless or live in other circumstances that lessens their access to safe or good-tasting water. Addressing water access issues may require addressing larger issues in these people’s lives.

Support water fluoridation in your community:

- *Talk about the benefits that come from drinking fluoridated water.* If questions arise, do your best to answer them or point them to iLikeMyTeeth.org website (American Academy of Pediatrics), where they can find reliable information.
- *Be proactive.* The best time to educate people about fluoride is before a local CWF program is publicly criticized. Education can help to address confusion and misinformation about fluoride. Once the issue arises in a community, it is tougher to correct myths. America celebrates the 75th anniversary of CWF in January 2020.



Promote water in your community:

- *Let teachers and school administrators in your area know about the Virginia-based Rev Your Bev website's lesson plans* (both English and Spanish), as well as its newsletter for parents and other materials. Educators are often looking for learning activities that promote good, lifelong habits for their students. School nurses and health educators should consider downloading Rev Your Bev posters and displaying them in schools, health clinics and community centers.
- *Identify others who could join you in organizing a water promotion event.* Organizing such an event is easier thanks to the Virginia Foundation for Healthy Youth's Rev Your Bev initiative. Rev Your Bev encourages children to choose water over sugary drinks.[44] Visit the Rev Your Bev website to learn more about the kinds of activities that a local community could organize.

Support efforts to repair and upgrade local water infrastructure:

- *Make your voice heard in support of funding for infrastructure improvements.* Many of Virginia's public water systems need to rebuild or upgrade their infrastructure. Virginia Health Catalyst encourages state health officials to work with the legislature to offer special grants or other cost-sharing opportunities to help finance needed infrastructure repairs. Virginia lawmakers who serve in the U.S. House and Senate should explore new federal pathways for funding.

For more information about water promotion and water fluoridation, visit the following resources:

Virginia Health Catalyst

<https://vahealthcatalyst.org/community-resources/community-water-fluoridation/>

Rev Your Bev Virginia Foundation for Healthy Youth

<https://revyourbev.com/>

Win With Water Missouri Foundation for Health

<https://mffh.org/wordpress/wp-content/uploads/2018/06/MCP-Win-with-Water-Toolkit-June-2018.pdf>

Water Fluoridation Centers for Disease Control and Prevention

<https://www.cdc.gov/fluoridation/>



Virginia
Health Catalyst
The Intersection of Overall
Health and Oral Health

End notes

- [1] Wakefield Research, online survey of 1,000 nationally representative U.S. adults, commissioned by the American Fluoridation Society. Feb 2019.
- [2] "Higher consumption of sugary beverages linked with increased risk of mortality." Harvard T.H. Chan School of Public Health. Mar 18, 2019. Accessed in July 2019 at <https://www.hsph.harvard.edu/news/press-releases/sugary-beverages-linked-with-higher-risk-of-death/>.
- [3] This calculation is based on data showing that the soft drink company spent \$377 million in the U.S. during 2017 to advertise its flagship beverage. See: Guttman A. Advertising spending of selected beverage brands in the United States in 2017 (in million U.S. dollars). Statista. Jul 30, 2019. Accessed in Aug 2019 at <https://www.statista.com/statistics/264985/ad-spend-of-selected-beverage-brands-in-the-us/>.
- [4] Norfolk's 2019 fiscal year budget devotes funding of \$89,144,865 for the Water Utility. Calculated as a daily cost, this expenditure is roughly one-fourth the amount that Coca-Cola spends on its signature soda brand. This budget was adopted in May 2019. See: Proposed Fiscal Year 2019 Budget. City of Norfolk, Virginia. Accessed in Aug 2019 at <https://www.norfolk.gov/DocumentCenter/View/36799>.
- [5] Daigneau E. Cities Tout Municipal Tap Water as Better Than Bottled. Governing. April 2012. Accessed in Aug 2019 at <https://www.governing.com/topics/health-human-services/gov-cities-tout-municipal-tap-water-as-better-than-bottled.html>.
- [6] Perspectives on America's Water. A national survey of 4,381 U.S. adults, conducted by PSB Research and commissioned by Nestle Waters. Feb 2017. Accessed in Aug 2019 at https://www.nestle-watersna.com/content/documents/pdfs/perspectives_on_americas_water-june2017.pdf.
- [7] The State Of Obesity. "The State of Obesity in Virginia." Robert Wood Johnson Foundation. Accessed in July 2019 at <https://www.stateofobesity.org/states/va/>.
- [8] "Virginia Data & Oral Health Report Card." Virginia Oral Health Coalition. 2016. Accessed in July 2019 at <https://www.vaoralhealth.org/provider-resources/oral-health-report-virginia-specific-data/>.
- [9] "The Burden of Diabetes in Virginia." American Diabetes Association. 2017. Accessed in July 2019 at <http://main.diabetes.org/dorg/PDFs/Advocacy/burden-of-diabetes/virginia.pdf>.
- [10] "Higher consumption of sugary beverages linked with increased risk of mortality." Harvard T.H. Chan School of Public Health. Mar 18, 2019. Accessed in July 2019 at <https://www.hsph.harvard.edu/news/press-releases/sugary-beverages-linked-with-higher-risk-of-death/>.
- [11] This is based on various research projects, including three 2018 focus groups conducted among parents and grandparents in three communities of West Virginia. These focus groups were sponsored by the West Virginia Oral Health Coalition.
- [12] Scotti A. "Gatorade launches new version 'Zero' without any sugar or carbs." New York Daily News. Jun 20, 2018. Accessed at <https://www.nydailynews.com/news/national/ny-fea-gatorade-zero-no-sugar-20180620-story.html>.
- [13] "Sugar rush: the hidden risk of sports drinks." BMI Healthcare. Accessed in July 2019 at <https://www.bmihealthcare.co.uk/health-matters/health-and-wellbeing/the-hidden-risk-of-sports-drinks#gdp-out>.
- [14] Coffman MA. "How Many Tablespoons of Sugar Are in a Single Energy Drink?" San Francisco Chronicle, Hearst Newspapers LLC. Dec 6, 2018. Accessed in July 2019 at <https://healthyeating.sfgate.com/many-tablespoons-sugar-single-energy-drink-11065.html>.
- [15] Sifferlin A. "Most Energy Drink Companies Market to Minors, Report Finds." Time. Jan 9, 2015. Accessed at <https://time.com/3661633/most-energy-drink-companies-market-to-minors-report-finds/>; "Hidden Caffeine," American Academy of Pediatrics, HealthyChildren.org. Accessed at <http://bit.ly/2LWklpD>; "Spilling the Beans: How Much Caffeine is Too Much?" U.S. Food and Drug Administration. Dec 12, 2018. Accessed at <https://www.fda.gov/consumers/consumer-updates/spilling-beans-how-much-caffeine-too-much>.
- [16] Shah SA, Szeto AH, Farewell R, Shek A, Fan D, Quach KN, Bhattacharyya M, Elmiairi J, Chan W, O'Dell K, Nguyen N, McGaughey TJ, Nasir JM, Kaul S. "Impact of High Volume Energy Drink Consumption on Electrocardiographic and Blood Pressure Parameters: A Randomized Trial." Journal of the American Heart Association. 2019, 8:11 (doi: 10.1161/JAHA.118.011318).
- [17] "Kids Should Not Consume Energy Drinks, and Rarely Need Sports Drinks, Says AAP." American Academy of Pediatrics. May 30, 2011. Accessed in July 2019 at <https://www.aap.org/en-us/about-the-aap/aap-press-room/pages/kids-should-not-consume-energy-drinks,-and-rarely-need-sports-drinks,-says-aap.aspx>.
- [18] Community Water Fluoridation Program: Virginia State Plan 2012, Virginia Department of Health (Dental Health Program, Division of Child and Family Health). 2012. Accessed in July 2019 at <http://www.vdh.virginia.gov/content/uploads/sites/31/2017/11/VIRGINIA-Fluoridation-Plan-2012-Final-.pdf>.
- [19] The most recent year for which Virginia reported its CWF data is 2014. For more information, see: Centers for Disease Control and Prevention. Community Water Fluoridation: Fluoridation Statistics (2014)." Dec 1, 2017. Accessed in July 2019 at https://www.cdc.gov/fluoridation/statistics/reference_stats.htm.
- [20] The Healthy People goal for each state is for CWF to reach 79.6 percent of the population served by a public water system. For more information, see: Office of Disease Prevention and Health Promotion. "OH-13: Increase the proportion of the U.S. population served by community water systems with optimally fluoridated water." Healthy People 2020, U.S. Department of Health and Human Services. Jul 18, 2019. Accessed in July 2019 at https://www.healthypeople.gov/node/5003/data_details.
- [21] Centers for Disease Control and Prevention. Water Fluoridation Basics. May 14, 2019. Accessed in July 2019 at <https://www.cdc.gov/fluoridation/basics/index.htm>.
- [22] Centers for Disease Control and Prevention. Water Fluoridation Basics. May 14, 2019. Accessed in July 2019 at <https://www.cdc.gov/fluoridation/basics/index.htm>.
- [23] "Surgeons General's Statements on Community Water Fluoridation." Centers for Disease Control and Prevention. Jun 9, 2016. Accessed in July 2019 at <https://www.cdc.gov/fluoridation/guidelines/surgeons-general-statements.html>.
- [24] Armstrong PW, Naylor CD. "Counteracting Health Misinformation: A Role for Medical Journals?" Journal of the American Medical Association. 2019, 321:19.
- [25] Branscome J. "Spotsylvania leaders end debate on fluoridated water." The Free Lance-Star (Fredericksburg, VA). Feb 13, 2018. Accessed in July 2019 at https://www.fredericksburg.com/news/local/spotsylvania-leaders-end-debate-on-fluoridated-water/article_f1f870ab-ed60-5d85-908e-1ce5e53d414c.html.
- [26] Meyer J, Margariti V, Mendelsohn A. "Consequences of community water fluoridation cessation for Medicaid-eligible children and adolescents in Juneau, Alaska." BMC Oral Health. 2018, 18:215.
- [27] McLaren L, Patterson S, Thawer S, Faris P, McNeil D, Potestio M, Shwart L. "Measuring the short-term impact of fluoridation cessation on dental caries in Grade 2 children using tooth surface indices." Community Dentistry and Oral Epidemiology. 2016, 44:3.

End notes

- [28] Some research suggests that Americans have higher confidence in the safety of bottled water. For one example, see: Saylor A, Prokopy LS, Amberg S. "What's wrong with the tap? Examining perceptions of tap water and bottled water at Purdue University." *Environmental Management*. Sep 2011, 48:3.
- [29] Centers for Disease Control and Prevention. "Regulations: The Safe Drinking Water Act." Apr 10, 2019. Accessed in July 2019 at <https://www.cdc.gov/healthywater/drinking/public/regulations.html>.
- [30] "Tap Water vs. Bottled Water." Food & Water Watch. Accessed in July 2019 at <https://www.foodandwaterwatch.org/about/live-healthy/tap-water-vs-bottled-water>.
- [31] Baumgartner M. "Study: Bottled Water No Safer Than Tap Water." ABC News. May 3, 2019. Accessed in July 2019 at <https://abcnews.go.com/Business/study-bottled-water-safer-tap-water/story?id=87558>.
- [32] Nanne S. "The magic of pH." *Dentistry IQ*. Feb 2, 2015. Accessed in July 2019 at <https://www.dentistryiq.com/dental-hygiene/clinical-hygiene/article/16350765/the-magic-of-ph>.
- [33] Wright KF. "Is Your Drinking Water Acidic? A Comparison of the Varied pH of Popular Bottled Waters." *Journal of Dental Hygiene*. Jun 2015. 89, Supplement 2. Accessed in July 2019 at https://jdh.adha.org/content/89/suppl_2/6; O'Neill M. "Is Bottled Water Ruining Your Teeth?" *Daily Mail*. Aug 11, 2017. Accessed in July 2019 at <https://www.dailymail.co.uk/health/article-4782672/Bottled-water-acidic-erode-tooth-enamel.html>.
- [34] Boesler M. "You Are Paying 300 Times More for Bottled Water than Tap Water." *Business Insider*. Jul 12, 2013. Accessed at <https://slate.com/business/2013/07/cost-of-bottled-water-vs-tap-water-the-difference-will-shock-you.html>.
- [35] Tack Back the Tap: The Big Business Hustle of Bottled Water. Food & Water Watch. Feb 2018. Accessed in Aug 2019 at https://www.foodandwaterwatch.org/sites/default/files/rpt_1802_tbtbigwaterhustle-web.pdf.
- [36] United Nations. "Our planet is drowning in plastic pollution." UN Environment. Accessed in July 2019 at <https://www.unenvironment.org/interactive/beat-plastic-pollution/>.
- [37] Felton R. "What Exactly Is 'Alkaline' Water, Anyway? And What about 'Raw' or Even 'Spring' Water?" *Consumer Reports*. May 15, 2019. Accessed in July 2019 at <https://www.consumerreports.org/bottled-water/bottled-water-labels-what-is-alkaline-raw-spring-water/>.
- [38] Johnson, J. "Fluoride Critics Use Flint to Push Their Own Agenda." *Dentistry Today*. Mar 21, 2016. Accessed in July 2019 at <https://dentistrytoday.com/news/todays-dental-news/item/822-fluoride-critics-use-flint-to-push-their-own-agenda>.
- [39] In October 2015, U.S.-based Google searches related to water quality jumped 380 percent. For more information, see: "Searching for News: The Flint Water Crisis." Pew Research Center. Apr 27, 2017. Accessed in July 2019 at <https://www.journalism.org/essay/searching-for-news/>.
- [40] "Drinking Water Quality." Newport News Waterworks. Accessed in July 2019 at <https://www.nngov.com/275/Drinking-Water-Quality>.
- [41] American Society of Civil Engineers, Virginia Section. 2015 Report Card for Virginia's Infrastructure. Accessed in July 2019 at <https://www.infrastructurereportcard.org/wp-content/uploads/2016/10/2015-Report-Card-for-Virginia-Infrastructure-Brochure1.pdf>.
- [42] Proposed Fiscal Year 2019 Budget. City of Norfolk, Virginia. Accessed in Aug 2019 at <https://www.norfolk.gov/DocumentCenter/View/36799>.
- [43] Virginia Water and Wastewater Rates Dashboard. University of North Carolina School of Government, Environmental Finance Center. Accessed in August 2019 at <https://efc.sog.unc.edu/resource/virginia-water-and-wastewater-rates-dashboard-0>.
- [44] Sawyer L. "Rev Your Bev Q&A – Promoting Water in Our Communities," Virginia Health Catalyst blog, Apr 22, 2019. Accessed in July 2019 at <https://www.vaoralhealth.org/rev-your-bev-qa-promoting-water-in-our-communities/>.



vahealthcatalyst.org

804.269.8720

***Follow us on Twitter and Facebook
(@vahealthcatalyst)***