How State Plumbing Codes Can Increase Access to Drinking Water in Schools

For both environmental and health reasons, clean and accessible drinking fountains are making a comeback. This resource provides child health advocates with information on how to modernize school drinking water infrastructure by using their state's plumbing codes.

The traditional drinking fountain is having a renaissance of sorts, thanks to the advent of bottle-filling technology with features such as hands-free activation; filtration; chilling; and counters for plastic bottles saved. Motivated by environmental concerns about plastic trash from disposable water bottles and heightened awareness of plain water's health benefits, college and university campuses throughout the country have upgraded their drinking fountains. Other public spaces such as schools, airports, and hospitals are starting to do the same. There exist two major model plumbing codes which states can use to set minimum standards for drinking water infrastructure in school buildings. In 2015, for the first time, both of these model codes included bottle-filler provisions.

The public health community has long recognized the benefits of increasing water intake in the general population, particularly among children. Access to appealing and safe drinking water benefits child cognition and oral health. Moreover, the substitution of plain water for sugary drinks can help children maintain a healthy body weight.[1] A 2016 study published in *JAMA Pediatrics* found that the installation of water jets in a large sample of public schools in New York City resulted in a reduction in the

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NATIONAL POLICY & LEGAL ANALYSIS NETWORK TO PREVENT CHILDHOOD OBESITY

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School facilities inventories use lengthy surveys to collect information about the age of school buildings, the number of floors, the number of portable classrooms, student enrollment, square footage, and the condition of building systems, including plumbing. Summary reports are usually provided to the public, and more detailed information can be obtained from the agency that conducted the survey. This information can be used to gauge the impact and effectiveness of a proposed drinking water policy change. The National Center for Education Statistics maintains a list of state agencies that conduct school facilities inventories.[30]

For example, in 2015, Washington began the process of amending its plumbing code with a proposed provision to require a minimum of one bottle filling station on each floor of buildings otherwise required to have drinking fountains.[31] According to information collected during a 2014 statewide school facilities inventory,[32] 90 percent of school buildings in the state are single-story buildings.[33] This means that, in practice, the one-bottle-filler-per-floor provision would translate to a minimum of one required bottle filler in most school buildings.

To Filter or Not to Filter?

Water filtration can improve the taste and appeal of tap water to students. From a basic safety standpoint, filtration should not be needed in schools with properly maintained plumbing systems that receive water from a regulated public water supplier. School buildings can draw drinking water from a public water supplier or an on-site well. Almost 80 percent of school buildings receive treated drinking water from a public water supplier.[34] Schools that have an on-site well are responsible for ensuring that their water meets federal and state water quality laws and regulations.[35]

Although communities and school districts should be able to count on safe drinking water, recent events in Flint, MI, raise concerns about public water systems particularly in low-income communities. The Environmental Protection Agency's drinking water webpage and the Centers for Disease Control and Prevention's public water systems webpage serve as starting points for individuals who want to learn more about drinking water testing and regulation.

Potable water is piped into the building and then circulates through the school plumbing system. Water can become unsafe when it comes into contact with plumbing materials, like lead and copper, which corrode over time and may leach into the water. Sediment containing these toxic substances can build up

Asking the Right Questions

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School water source:

Public Water Supplier:_____

On-Site Well:_____

Other:_____

Total number of working drinking fountains per school building:_____

(this information is essential to ensuring that there is an adequate number of fountains to service the student population)

Number of drinking fountains in close proximity to playground:_____

Number of drinking fountains in close proximity to gymnasium:_____

Number of drinking water sources in school cafeteria:

Traditional plumbed drinking fountains with mouth spigot:_____

Standalone bottle fillers:_____

Fountain and bottle-filler combination units:_____

Plumbed, tap water dispensing units:_____

Non-plumbed, tap water dispensing units (food service employees manually filling cups with tap water):_____

Age of drinking water fixtures:_____

Point-of-entry water treatment device in use: ___Yes ___No
(If "Yes," describe type, e.g. reverse osmosis):_____)

Point-of-use water treatment devices in use on student-accessible drinking fountains: _____Yes _____No
(If "Yes," provide total number in use_____)

Point-of-use water treatment devices in use on taps used for food preparation and cooking: _____Yes _____No
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likelihood of students being obese or overweight.[2] Thus, many school nutrition policies require that children have access to free drinking water during mealtimes, and these policies focus strongly on drinking water infrastructure in school cafeterias. Yet, almost one-third of US school buildings have plumbing systems in fair or poor condition.[3] A number of low-income school districts with children at highest risk for overweight and obesity have struggled with water quality and, in some cases, have had to rely upon bottled water.[4] This can lead to a situation in which children don't have plain drinking water at school, particularly those children who need it the most.[5]

Over time, as school plumbing systems age, they need to be upgraded. This resource describes how child health advocates can use state plumbing codes to modernize school drinking water infrastructure. It also provides an overview of how to use school facilities data to inform the policy change process, and includes examples of key provisions that can optimize water access in schools.

Moving Beyond the Traditional Drinking Fountain

The drinking fountain, with its familiar bowl and spigot, is both maligned for being poorly maintained and unsanitary, and revered as a symbol of a time when free public drinking water was easier to come by. Fountains were designed for people to get a small drink of water without a cup and without their mouths touching any part of the apparatus. A design that was originally intended to be sanitary and publicly accessible now makes fountains less attractive than bottled beverages to many. Bottled water is typically sold chilled, is perceived as more sanitary than fountain water, and is touted as specially filtered and treated for taste and safety. Consumers are willing to pay an amazingly high premium for bottled water: eight glasses of tap water per day costs 49 cents a year versus $1,400 for the same amount of bottled water.[6]

Public interest in healthier beverages, concern about plastic trash, and more budget-conscious consumers led to the rise of the reuseable water bottle. In 2014, US sales of reuseable beverage containers were $1.5 billion, and sales are expected to continue to grow.[7] Drinking fountains are a logical place to refill water bottles. The traditional design, however, does not provide enough space between the spigot and the bowl to angle a bottle into position for filling without touching the mouth spigot.

In response to the increase in reuseable bottle use, the plumbing fixture industry produced a number of fountain designs that incorporate bottle filling technology. Instead of shooting water up in an arc through a spigot, a bottle filler dispenses water straight down so that a user can quickly fill a receptacle such as a water bottle. These designs were first launched in the late 2000s. In less than ten years, they have been installed on more than 300 US college and university campuses, and installations continue to increase in schools and other public buildings.[8]

School Water Bottle Policies

The Centers for Disease Control and Prevention (CDC) recommends students be allowed to carry reuseable water bottles as a way to ensure healthy beverage consumption.[9] A 2012 CDC study found that the majority of schools surveyed allowed students to carry reuseable water bottles during all or part of the school day.[10] Middle and high schools may be concerned about students using water bottles to bring alcoholic drinks into school. One way to deal with this is to require that water bottles be clear. One Oregon school district that implemented such a policy, however, initially had trouble finding a vendor that produced clear bottles.[11] If schools do not allow reuseable water bottles, or most of their students simply don't use them, they can still encourage water consumption by providing disposable cups next to bottle fillers.

School Drinking Water Infrastructure Policies

State plumbing codes set the basic requirements for drinking water in schools. They are a subset of building codes adopted by state agencies, and enacted and enforced by local governments. State building code and standards agencies periodically update their building code standards.

Since the middle of the 20th century, there has been an emphasis on uniformity in building codes, such as plumbing codes. Technical requirements and up-to-date material performance standards help ensure public safety.[12] The International Code Council and the International Association of Plumbing and Mechanical Officials are the two major model code organizations. They produce the International Plumbing Code (IPC) and the Uniform Plumbing Code (UPC), respectively. In 2012, thirty-six states had adopted the International Plumbing Code, and California, the most populous state in the nation, had adopted the Uniform Plumbing Code.[13] States can freely amend these model codes and many do.

School Water Fountain Requirements

Primary and secondary school buildings are considered "educational occupancies" and are addressed as such in state plumbing codes. Typically, a minimum number of plumbing fixtures, e.g. toilets and drinking fountains, are required per number of occupants. Plumbing codes can also contain: definitions of drinking fountains and other drinking water fixtures; fountain placement requirements (e.g. a minimum of one fountain per floor); allowable use of water dispensers to substitute for drinking fountains; and accessibility standards to align fixture requirements with the Americans with Disabilities Act.

With respect to school drinking fountains, state plumbing code minimum requirements range from 1 fountain per 30 occupants to 1 fountain per the first 150 occupants and 1 per each 500 occupants thereafter.[14] In 2012, the most widely adopted standard was the International Plumbing Code ratio of 1 drinking fountain per 100 occupants, which allowed up to 50 percent of fountains to be substituted by water dispensers, such as 5-gallon drums.[15] It is important to note that plumbing codes set minimum standards—schools are free to install as many fountains as they'd like to meet the needs of students, faculty and staff.

From Drinking Fountains to Bottle Fillers

In 2000, the IPC contained a provision that allowed 100 percent of required drinking fountains to be replaced by water coolers, such as 5-gallon dispensers.[16] The 2003 model code reduced this substitution rate to a maximum 50 percent, and that standard remains in effect.[17] Some jurisdictions have allowed fee-based bottled water dispensers, e.g. vending machines, to substitute for a certain percentage of required drinking fountains.[18]

Despite these policies, according to one bottle filler manufacturer, "drinking fountains are not going away."[19] At the same time, bottle filling technology has been widely adopted even though only a few jurisdictions recognize or define their permissible use. In order to get around this policy void, bottle fillers have been installed together with traditional fountains. Thus, institutions wishing to install bottle fillers are able to meet the applicable plumbing code's minimum fixtures requirement while providing a bottle filler as an extra feature.

The 2015 version of the IPC, the mostly widely adopted model plumbing code, recognizes bottle fillers as a type of "water dispenser," which is defined as a plumbing fixture that is or is not connected to a potable water supply for the purpose of dispensing water into a receptacle such as a cup or bottle.[20] The code still allows bottled water dispensers to substitute for up to 50 percent of required fountains.[21] The 2015 Uniform Plumbing Code added a definition for plumbed "bottle filling stations"[22] and notes that drinking fountains "should also incorporate a bottle filling station."[23] It is now up to state and local jurisdictions to adopt the bottle filler and bottled water provisions as they are written in the model code, or to amend them as they see fit.

Bottle-Filler Policies at the Local Level

Policies to encourage tap water consumption and reduce bottled water use are of great interest to the environmental sustainability movement. As part of an initiative to "green" its building codes, New York City required, effective July 1, 2012, that 100 percent of drinking fountains include a bottle filler feature.[24] NYC's 2012 code change also repealed a 2007 provision allowing for-sale bottled water to substitute for drinking fountains.[25] In 2013, the City and County of San Francisco enacted a similar requirement in its Environment Code.[26] In 2014, the County of Santa Clara, CA required 1 bottle filler per building floor and 1 additional bottle filler per wing of large single story buildings.[27] These policy changes were motivated in whole or in part by environmental sustainability concerns, and exemplify the powerful potential of collaborating with the sustainability movement on drinking water initiatives.

Special Consideration for Elementary Schools

Researchers working in elementary schools have found that bottle fillers can provide drinking water to young children. Special consideration must be paid to students' height and strength. Bottle fillers should be placed at an age-appropriate height, and children must be able to easily press the button or sensor pad that activates the flow of water.[28]

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Plumbed, tap water dispensing units:_____

Non-plumbed, tap water dispensing units (food service employees manually filling cups with tap water):_____

Age of drinking water fixtures:_____

Point-of-entry water treatment device in use: ___Yes ___No
(If "Yes," describe type, e.g. reverse osmosis):_____)

Point-of-use water treatment devices in use on student-accessible drinking fountains: _____Yes _____No
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over time, especially when a plumbing system is not being used (e.g. over the weekend, during vacation periods), and this can pose a safety hazard to children. To prevent this, many schools flush taps and fountains used for cooking and drinking at the beginning of the school day and after periods of low usage.[36] The U.S. Environmental Protection Agency provides comprehensive information about water quality in schools on its Drinking Water at Schools and Child Care Facilities webpage.[37]

Bringing Fountains Into the Future to Meet the Needs of Today's School Children

This section describes specific, state-level options that policymakers and advocates can pursue to modernize school drinking water infrastructure and support overall child health.

Know Your Ratio

The minimum required number of drinking fountains varies from state to state. Unfortunately, there exists little research into what is the optimal ratio of fountains to building occupants. One analysis of survey data did find that students were less likely to report that fountains were widely available in their school buildings if they lived in states with plumbing codes that required fewer fountains per number of students.[38] States can therefore amend their plumbing codes for educational occupancies to provide, for example, at least 1 drinking fountain per 100 occupants.

> Sample Policy Language

- In educational occupancies, drinking fountains shall be provided at a ratio of 1 per ___ building occupants.

Put Water In Its Proper Place

Perhaps just as important as the number of drinking fountains in a school building is their placement. Fountains that are located in remote areas of a campus or areas of a school building that are not accessible to students for the entire day are likely to get little use and may be targets for vandalism. Placement provisions in state plumbing codes merely require at least one drinking fountain per occupied floor in school buildings, or that fountains be "conveniently located" for use by students.[39]

School cafeterias are a key focus area for placement, as are playgrounds, gymnasiums, and other high-traffic areas. The Healthy, Hunger-Free Kids Act of 2010 requires that schools participating in the National School Lunch Program make drinking water available to students free of charge in the place where meals are served.[40] Neither the IPC nor the UPC contains a fountain placement provision. The UPC states that where food is served "water stations" may substitute for the traditional drinking fountain, but the UPC does not actually require that water stations be placed in school cafeterias.[41]

State plumbing codes can require that drinking fountains, bottle filling stations, and/or other water dispensers be placed in school cafeterias in adequate numbers to service the number of students utilizing the cafeteria during each meal service period. For example, the 2015 IPC requires 1 fountain per each 500 occupants in banquet halls and food courts,[42] and the 2015 UPC requires 1 fountain per 250 occupants for restaurants and banquet halls that serve up to 750 people.[43] In a school cafeteria where water must be accessible without restriction, an adequate number of fixtures could be determined by applying the minimum fixture requirement for the entire building to the food service area specifically. Thus, in a state requiring 1 fountain per 100 school building occupants, a cafeteria designed to seat 300 students per meal service would be required to have at least three student-accessible sources of drinking water.

> Sample Policy Language

- In food service areas, one student-accessible drinking fountain or water station shall be provided for each ___ students served during a typical full meal service. All school food service areas, regardless of the number of students served, shall have at least one student-accessible drinking fountain or water station.
- Drinking fountains shall be placed in close proximity to gymnasiums and outdoor learning and activity areas, including playgrounds and athletic facilities.

Fill It Up!

There are a wide range of options for dispensing tap water in schools.[44] Bottle fillers have gathered momentum as a complement to drinking fountains. Some local jurisdictions have gone so far as to require that all fountains integrate bottle filler technology, and have even allowed bottle fillers to stand in for up to half the number of required fountains. The drawback is that bottle fillers do not provide a mouth spigot. Therefore, in school settings, bottle-filler-only stations should include cups to ensure that students without a water bottle can get a drink.

> Sample Policy Language

- Where drinking fountains are required, a bottle filling station shall be provided with each fixture installation.
- Bottle filling stations shall be permitted to substitute for up to 50 percent of required drinking fountains.

Cups, Cups, Cups

Children, teens, and adults are used to receiving beverages in containers. At home and in child care, children are taught to drink from cups. Yet, at school, when it comes to accessing tap water—which is likely the least expensive, most environmentally friendly, and healthiest option—students are expected to hover their mouths over a fountain spigot just to get a very small amount of water into their mouths. Cups can encourage plumbed water use and make water more accessible than less-healthy beverages available to children.

A key difference between traditional drinking fountains and bottle fillers is that students must have a cup or reuseable bottle to get a drink from a bottle filler. Cups need to be purchased[45] and staff time is required to stock them and to dispose of cup trash. West Virginia is currently the only state to require that schools provide cups together with water dispensers during meal service.[46] The West Virginia State Office of School Nutrition encourages schools to provide cups that hold at least 8 oz. of water, because smaller cups can result in students getting up repeatedly for refills.[47] In order to keep cup costs down, schools can encourage and support student use of reuseable bottles. Even in schools with a robust culture of reuseable bottle usage, cups provide a safety net for students when they invariably forget their bottles at home or lose them altogether.

> Sample Policy Language

- In food service areas, cups with a minimum capacity of 8 oz. shall be provided.
- Cups shall be provided at all bottle filling stations that do not include a drinking fountain.

Conclusion

Water is the healthy alternative to sugary drinks. Overconsumption of sugary drinks is linked to unhealthy weight gain, tooth decay, and chronic diseases like type-II diabetes. Bottled beverages are heavily marketed, sold in user-friendly containers, and refrigerated, which makes them appealing to students. State and federal school nutrition policies have done a lot to make a healthier mix of bottled beverages available to students during the school day, but plumbed drinking water infrastructure in schools continues to lag behind. This problem is often most acute in low-income and minority communities where heavy marketing of sugary drinks and under-resourced school building infrastructure create an unhealthy beverage environment for children who are already most at risk for diet-related chronic disease. State-level policy change to modernize school drinking water infrastructure is one of many strategies that can increase access to fresh, safe drinking water and reduce the consumption of sugary drinks, with the overarching goal of improving children's health.

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[38] Onufrak, *supra* note 13.

[39] Id.

[40] 7 C.F.R. § 210.10(a)(1)(i) (2015).

[41] 2015 Uniform Plumbing Code § 415.2 (2015).

[42] 2015 International Plumbing Code § 410.4 (2015).

[43] 2015 Uniform Plumbing Code Table 422.1 (2015).

[44] Anna Grummon et al., *Water Works: A Guide to Improving Access to and Consumption of Water in Schools to Improve Health and Support Learning* (2014), *http://waterinschools.org/pdfs/WaterWorksGuide2014.pdf* (last visited Dec. 29, 2015) (describing numerous water delivery options for school buildings).

[45] *Id.* at 55-57.

[46] W. Va. Code R. § 126-86-8 (2014).

[47] Telephone conversation with Celeste Peggs, Coordinator, West Virginia Office of Child Nutrition, in Charleston, W. Va. (June 23, 2015).