



Encouraging Consumption of Water in School and Child Care Settings: Access, Challenges, and Strategies for Improvement

Anisha I. Patel, MD, MSPH, MSHS, and Karla E. Hampton, JD

Children and adolescents are not consuming enough water, instead opting for sugar-sweetened beverages (sodas, sports and energy drinks, milks, coffees, and fruit-flavored drinks with added sugars), 100% fruit juice, and other beverages. Drinking sufficient amounts of water can lead to improved weight status, reduced dental caries, and improved cognition among children and adolescents.

Because children spend most of their day at school and in child care, ensuring that safe, potable drinking water is available in these settings is a fundamental public health measure.

We sought to identify challenges that limit access to drinking water; opportunities, including promising practices, to increase drinking water availability and consumption; and future research, policy efforts, and funding needed in this area. (*Am J Public Health*. 2011;101:1370–1379. doi:10.2105/AJPH.2011.300142)

DURING THE EARLY 20TH CENTURY, the discovery that provision of safe drinking water could prevent infectious diseases led to federal regulation of drinking water quality.¹ Since then, the importance of safe drinking water has expanded beyond the prevention of

infectious disease to the removal of chemical pollutants.¹ More recently, water has become increasingly viewed as an essential nutrient that has a role in overall bodily system functioning (e.g., cognition)^{2–4} and in the prevention of chronic conditions and diseases common in the 21st century (e.g., obesity, dental caries).^{5–13}

Studies have demonstrated that drinking water can improve students' readiness to learn by increasing their level of cognitive functioning.^{2–4} Increasing water consumption may also help limit excess weight gain among children, adolescents, and adults.^{5–11} Consuming water instead of sugar-sweetened beverages (e.g., sodas, sports drinks, flavored milks, fruit-flavored drinks, and other beverages with added sugar) can also prevent dental caries.^{12–14}

Despite these studies, water intake among most children is insufficient. According to a national study, young people have total water intakes lower than the Institute of Medicine recommendations.¹⁵ Among adolescents, plain drinking water accounted for only 33% of total water intake, with the remaining intake consisting of beverages containing excess calories.¹⁵

Because children spend most of their day at school and in child care,¹⁶ policies and programs in

these settings can affect children's water intake. We discuss drinking water accessibility in schools and child care facilities, including the regulatory framework that guides such access, challenges that limit access to drinking water, opportunities to improve drinking water access and consumption in schools, and recommendations to enhance drinking water access and intake in schools and child care settings.

WATER ACCESS POLICIES AND REGULATIONS

Drinking fountains are the primary source of tap water in most schools and larger child care facilities in the United States. Also, tap water may be provided in pitchers or other dispensers.¹⁷ In addition, some schools provide bottled water at no cost or for purchase through vending machines or school stores. Federal, state, and local regulations and policies ultimately influence drinking water access in US schools and child care facilities.

Federal

The Food and Nutrition Service of the US Department of Agriculture (USDA) establishes regulations and guidelines for the federal child nutrition programs,

including the National School Lunch Program (NSLP) and the School Breakfast Program. These 2 federally assisted school meal programs serve nutritionally balanced, low- or no-cost meals to students daily.¹⁸ The Food and Nutrition Service also sets rules for the Child and Adult Care Food Program (CACFP) that provides nutritious meals and snacks to children in child care facilities and young people who participate in eligible after-school care programs or reside in emergency shelters.¹⁹ These meal programs play an important role in children and adolescents' dietary habits, especially because students consume a substantial portion of their total daily calories in schools and child care.²⁰ Historically, these programs did not require that free drinking water be offered during meals and did not include water as a reimbursable meal component.

The Healthy, Hunger-Free Kids Act of 2010 authorizes funding and sets policy for USDA's child nutrition programs, including the NSLP, the School Breakfast Program, and the CACFP. The act requires schools participating in federally funded meal programs to make water available during meal periods at no cost to students.²¹ It also mandates that child care



facilities provide free drinking water throughout the day.²¹

State

State agencies (e.g., state department of education) administer the federal meal programs, and their nutrition standards (e.g., sodium, sugar, fat content) may exceed federal requirements. Prior to passage of the Healthy, Hunger-Free Kids Act, California passed legislation to require schools to provide free drinking water during mealtimes.²² State child care licensing agencies may also mandate that clean, sanitary drinking water be available so that children can serve themselves.²³ In addition, states may have rules, such as building codes, that govern drinking water infrastructure in schools.^{24,25} Washington's building code requires 1 drinking fountain per 150 people on school campuses.²⁴

Local

In addition to federal and state regulations, drinking water access policies can also be implemented at the local level through school board policies and child care operational guidelines. The Child Nutrition and WIC Reauthorization Act of 2004 requires all schools participating in a federally funded meal program to have a school wellness policy that includes nutrition guidelines for all foods and beverages available on campus during the school day.²⁶ Through wellness policies, school officials have an opportunity to develop innovative, tailored programs to increase drinking water availability. To date, federal and state agencies that administer the CACFP do not require child care facilities

to develop a comprehensive written policy similar to school wellness policies. However, child care programs can implement guidelines that promote drinking water availability.

CHALLENGES IN PROMOTING ACCESS AND CONSUMPTION

Even if schools and child care facilities are interested in improving drinking water access and consumption, a number of barriers hinder these institutions' ability to do so. To devise policies and interventions that promote drinking water access and intake in schools and child care facilities, we must first understand these barriers, which range from deteriorating plumbing to increased access to sugary beverages.

Deteriorating Drinking Water Infrastructure

The Safe Drinking Water Act authorizes the US Environmental Protection Agency (EPA) to set national drinking water standards.²⁷ These standards apply to public water systems that supply tap water in most schools (8%–11% of schools that receive water from a private water source, such as a well, are required to test water and report problems to the state).^{27,28} However, no federal law requires schools and child care facilities that receive drinking water from a public water system to assess water quality; this lack of regulation may result in unsafe school drinking water, especially in older schools with deteriorating infrastructure. For example, lead, a contaminant associated with developmental delays and anemia in children,^{29,30}

may enter drinking water from solder, plumbing, or fixtures while in transit from the treatment plant to water outlets in schools or child care facilities.^{31,32}

Given that approximately 73% of US schools were built before 1969, it is not surprising that many schools are in need of significant infrastructure repairs such as those for old plumbing or fixtures.³³ Reports have documented elevated lead levels in drinking water in schools in Philadelphia, Pennsylvania, Seattle, Washington, New Jersey, and Los Angeles, California.^{34–38} Because young children are more susceptible to the effects of lead than are older children and adults, water quality may be a larger concern for child care settings. For example, infants' diets may consist, in large part, of formula that can be mixed with tap water containing high lead levels.³⁹ With fears about lead and other contaminants seeping into school drinking water from plumbing, tap water safety is a concern for many parents, students, and school staff.¹⁷ Even in circumstances in which tap water is safe, the water may still not appeal to consumers as a result of additional water quality concerns (e.g., taste, appearance, temperature).¹⁷

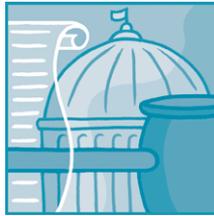
The EPA provides guidance for schools and child care facilities on testing drinking water, correcting water quality problems when they exist, and communicating drinking water testing results and actions to communities.^{32,39} Despite such guidance, in 2006 only 56% of US school districts required drinking water inspections for lead, and only 22% of districts had model drinking water quality policies.⁴⁰ In instances in which drinking water

quality is poor, schools may not have resources to replace old plumbing or fixtures. Such schools may instead rely on band-aid approaches to improve drinking water quality, such as flushing drinking fountains to decrease lead levels.⁴¹ This practice, however, does not address the appearance and function of the water outlets. In a California study, students reported avoiding water fountains when they are broken and dirty and produce unpalatable water.⁴²

Drinking water quality may also be a concern for schools and child care facilities that opt to provide bottled water.⁴³ Unlike tap water, bottled water is not regulated by the EPA but instead is monitored by the US Food and Drug Administration.⁴⁴ The Food and Drug Administration exempts 60% to 70% of US water that is packaged and sold in the same state, as well as carbonated or seltzer water.⁴⁵ In addition, bottled water is tested less frequently than is tap water, and often by a laboratory that is not certified by the state.⁴³ Ultimately, schools providing bottled water as a temporary solution may want to find another safe and environmentally sound way to make drinking water available in schools.

Limited Drinking Water Availability

Drinking fountains are the most prevalent mode of tap water delivery in schools and child care facilities. Small studies and anecdotal reports indicate that the inadequate number, inconvenient location, and poor maintenance of drinking water outlets discourage students from using school drinking fountains.^{17,42,46} In a 2010



study of 10 schools in California's North Coast region, 70% of students reported that water fountains looked "disgusting" and dispensed water that tasted "gross."⁴²

Although state agencies (e.g., state department of education) review and approve school sites and facility plans, local school boards maintain facilities and enforce building codes.²⁵ In some states, the minimum required ratio of drinking fountains to students is inadequate.^{24,25} For example, the California building code requires only that schools have 1 drinking fountain for every 150 students.²⁵ In addition, the code does not specifically require schools to refrigerate drinking water or to have drinking fountains in cafeterias.²⁵

Local school board policies also serve a crucial role in supporting water accessibility, yet few schools have policies that emphasize provision of free drinking water. According to a 2007 to 2008 national study of school wellness policies, only 13% of students were enrolled in a district with a policy that included language regarding free drinking water availability throughout the school day.⁴⁷ Even when such policies exist, the language is often limited in scope. Consequently, in some areas such as school cafeterias or temporary structures (e.g., portable classrooms), drinking water access may not be a major consideration. In a 2009 study of 284 California school districts, 40% of school district personnel, consisting primarily of food service directors, reported that none of the schools in their district offered free water to students in the cafeteria, and 58% reported that none of

their schools offered free water in temporary classroom structures.⁴⁸

Some schools have policies that may discourage water consumption. Examples include policies that ban reusable water bottle use because of concerns that students will bring in alcoholic beverages and policies that forbid water consumption in classrooms to prevent class disruptions (e.g., water spills, restroom breaks).⁴⁹⁻⁵¹

Although state child care licensing agencies may require that safe drinking water be available in child care facilities, they often do not specify the locations in which water should be made available. An observational study of 40 randomly selected child care facilities participating in the CACFP showed that only 35% of facilities had water available outdoors.⁵² Because young children experience increased water loss when active outside,⁵³ improving access to drinking water in outdoor play areas may be important, particularly in large facilities, in which outdoor spaces may not be located nearby classrooms. Limited personnel may further prevent child care staff from making repetitive water trips from classrooms to outdoor facilities.

Insufficient Federal Meal Program Regulations

Federal meal programs were established in the early 1900s to provide high-calorie foods to hungry, malnourished children.⁵⁴ Because obesity is a major health concern, even for children who are food insecure, dated federal school and child care meal programs fail to meet the current-day nutritional needs of young people.

For example, 100% fruit juice, which has been associated with obesity in some studies,^{55,56} can be selected as a reimbursable "fruit" within the current federal meal programs. The American Academy of Pediatrics recommends that daily juice portions not exceed 4 to 6 ounces for toddlers and young children or 8 to 12 ounces for older children and adolescents.⁵⁷ Because most fruit juice consumption occurs in the home,⁵⁸ children and adolescents may exceed daily recommended servings of juice if it is offered in schools and child care facilities. These settings can still provide students with daily recommended servings of fruit by offering whole fruit and water. However, currently there is no reimbursement available for provision of water, a noncaloric beverage.

Polices and regulations silent on drinking water access in school and child care settings may undermine efforts to encourage water consumption among children and adolescents. Although the Healthy, Hunger-Free Kids Act of 2010 mandates that free drinking water be available during meal periods, water is not considered part of the reimbursable meal, and students are not required to take the water. The Food and Nutrition Service is in the process of issuing proposed rules regarding drinking water availability in conjunction with the proposed regulations for all foods in schools.²¹ Because federal child nutrition programs have historically emphasized the provision of milk and juice in schools and child care facilities, these institutions may still be reluctant to offer water with snacks and meals.

In a qualitative study conducted primarily in the Los Angeles Unified School District, school staff expressed the unfounded belief that USDA regulations prohibited offering students free drinking water next to milk in school cafeterias.¹⁷ In a study of Connecticut child care centers, child care staff held a similar misperception that the CACFP prohibits offering children water with meals.⁵²

Increasing Availability of Competitive Beverages

Sodas and other sugar-sweetened beverages. Competitive foods and beverages, products sold outside the federal school meal programs, have become increasingly available in schools.⁵⁹ Sugar-sweetened beverages, 100% fruit and vegetable juices, and bottled water are the major types of competitive beverages sold and marketed in schools. Although state nutrition guidelines, school board policies, and voluntary beverage industry self-regulation have reduced the availability of sugary beverages in schools, more progress is needed.⁶⁰

In 2008, as many as 77% of US public secondary schools had soda or sports drinks available for purchase.⁶¹ This trend is even more alarming in elementary schools. Although low-fat milk and bottled water are the most commonly available drinks in elementary schools, high-calorie beverages were still widely available during the 2008–2009 school year (45% of students could buy beverages other than water, 100% fruit juice, and low-fat milk in vending machines, à la carte cafeteria lines, and school stores).⁶² Emerging data suggest that the availability of



competitive sugar-sweetened beverages in schools is linked to student intake of such beverages, which in turn is associated with increased caloric intake and obesity.⁶³⁻⁶⁵

Preferences for bottled water. Partly because of concerns about the safety of tap water and the appeal and convenience of packaged water, more than half of Americans drink bottled water.⁴⁵ This trend is reflected in US schools, in which bottled water has become an increasingly available alternative to tap water.⁶⁶ Although bottled water accounted for only 12% of high school competitive beverage volumes in 2004, this figure had more than tripled to 39% in 2009.⁶⁶ In schools, bottled water is typically available for purchase through vending machines, school stores, or canteens for around \$1.⁴² Relying on bottled water to address students' hydration needs is problematic. The cost of bottled water discourages children from drinking an adequate amount of water, and the excess waste from bottles that are discarded rather than recycled could have a negative environmental impact.⁴³

Fear of revenue loss. Many US schools rely on revenue from beverage sales and advertising as a discretionary funding source for school activities. Companies have exclusive contracts with schools to advertise and sell a single brand of beverages. These contracts often allow companies to market their products through logos on vending machines, sponsorship of athletic teams, distribution of branded paraphernalia, or multimedia advertisements.^{67,68} Of the nearly \$186 million spent on school food and

beverage marketing in 2006, marketing expenditures were highest for carbonated beverages.⁶⁷ As such, schools may fear revenue loss if they remove sugar-sweetened beverages from vending machines and ban junk food marketing.⁶⁹ In a California study, stakeholders frequently cited decreasing revenue from competitive beverage sales as a barrier to increasing the availability of water in schools.¹⁷ Also, school officials may believe that contracts with beverage companies to sell bottled water prohibit them from offering free drinking water.¹⁷ In addition, schools that rely on bottled water sales for profits may be reluctant to offer free drinking water. Although it is unlikely that vending agreements prohibit schools from offering free tap water to students, schools that have bottled water vending contracts may be forced to offer free bottled water of the brand specified in the contract.

IMPROVING DRINKING WATER ACCESS AND CONSUMPTION

An approach combining programmatic and policy strategies is necessary to improve drinking water access and intake in schools and child care facilities. We highlight specific strategies to improve drinking water provision and consumption in these settings, including case examples that may prove helpful in water policy implementation (Table 1). Although we attempt to provide a comprehensive review of factors that influence drinking water access and intake in schools and child care facilities, the limited

research available confines the discussion primarily to schools.

Improving the Quality of Tap Water

Implementing drinking water testing and remediation programs. To assist schools with water quality concerns, the EPA has developed guidelines for schools and child care facilities on how to test their drinking water, correct water quality problems, and communicate drinking water assessments to staff, students, and parents. Several states require child care facilities to test their drinking water for lead when obtaining or renewing their licenses. For example, New Jersey's child care licensing regulations require child care facilities to test their drinking water and to certify that it is safe for consumption.⁷⁰

School districts across the country have also taken a proactive role in developing drinking water quality testing programs and have even increased transparency by reporting testing results and remediation to parents, students, and staff. The Seattle Public School District instituted a comprehensive drinking water testing program for lead, copper, iron, and arsenic.⁷¹ The Los Angeles Unified School District tested every school drinking water outlet and posted water testing results on its Web site.³⁷

Some schools, however, cannot afford the costs associated with a testing and remediation program. A qualitative study conducted in California showed that school administrators and staff, health and nutrition agency representatives, and families in the

state perceived cost as a barrier to providing safe drinking water in schools.¹⁷ Study participants stated that funding was needed to test drinking water, replace lead-laden plumbing or fixtures, and provide staffing necessary to flush drinking water outlets.

To improve the quality and appeal of tap water, schools and child care facilities can restore deteriorating drinking water infrastructure (e.g., plumbing, drinking fountains) or, at a minimum, set and maintain hygiene standards for drinking water outlets. This requires upfront costs and time that may not be feasible for many schools and child care facilities. However, a number of strategies to secure funding to cover such repairs exist (see box on page 1375).⁷²⁻⁸¹ The Los Angeles Unified School District, for instance, used funds from a city bond earmarked for school improvements to repair plumbing in its schools.⁷⁶

Developing alternative means for providing appealing drinking water. For schools that lack resources to install new drinking water infrastructure, an alternative is to provide students free bottled water or to place filters on older drinking fountains. Some schools may find that providing free bottled water is less costly than is testing water quality and correcting problems.⁸² Bottled water, however, should be a temporary solution until schools can provide an alternate free tap water source. For example, California's Folsom Cordova Unified School District created a cafeteria hydration station (filtration device) that features a mural backsplash with water promotion messages to encourage student water intake.⁸³

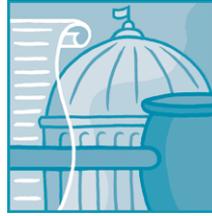


TABLE 1—Barriers to and Strategies for Increasing Water Access and Intake in School and Child Care Settings

	Barrier		Strategy
Poor drinking water quality	Contaminants (lead, arsenic)	Increase the availability of safe, palatable drinking water	Train personnel about drinking water quality issues
	Poor taste (warm, unpalatable)		Test drinking water for contaminants
	Poor appearance (discolored)		Develop an action plan for removing contaminants and provide alternate water sources if they exist Publicize testing/remediation efforts to parents, personnel, and students Provide more appealing forms of water (e.g., filtered, refrigerated, flavored with fruit slices)
Costs to increase access to safe, palatable drinking water	Cost associated with drinking water testing	Seek funding for school water-related programs	Seek federal, state, or municipal funding (e.g., bonds, school district funds)
	Repair and maintenance costs (e.g., old drinking water-related infrastructure)		Apply for foundation grants (e.g., Freddie Mac foundation, 3M Community Giving)
	Cost for removal of drinking water contaminants		Partner with private industry (e.g., reusable water bottle companies, filter manufacturers)
	Labor costs to maintain water sources		
Student, parent, and personnel preferences for beverages other than tap water	Increased preferences for sugary beverages	Improve student, parent, and personnel preferences for tap water	Provide palatable drinking water (e.g., cold, filtered, fruit flavored)
	Decreased preference for tap water owing to the taste, convenience, and perceived quality of bottled water		Set hygiene and maintenance standards for drinking water outlets Implement multimedia educational campaigns Encourage parents and school/child care personnel to model drinking tap water

Oakland, California, have used food service funds and funding from the parent teacher association and the city council to improve drinking water access for students in eating and common areas.¹⁷

Some New York City public schools have received financial assistance from the city’s departments of education and health to install water jets, similar to commercial water and ice dispensers used in restaurants, in their cafeterias.¹⁷ Each unit costs under \$1500 excluding additional expenses such as labor, maintenance, paper cups, and recycling bins. Schools can also partner with industry to reduce expenses. A public–private partnership between Utah public schools and a filter manufacturer supports the provision and maintenance of filters for 18 000 drinking fountains in more than 750 public schools at no cost to the schools.⁸⁰

In California, child care programs report using facility funds, parent donations, and funds from Head Start (a national program that provides education, health, nutrition, and parent involvement services to low-income children and their families) to offer drinking water.⁷⁸ These facilities provide water in a number of ways, including via drinking fountains, pitchers with paper cups, reusable sippy cups, and large water dispensers.⁷⁸

Schools will have costs associated with providing alternate drinking water. Such costs include an initial capital investment for the installation and

maintenance of a filtration device, labor needed to fill up and sanitize drinking water dispensers, and provision of cups in eating areas.¹⁷ Parents and

community advocates can work with school boards and local governments to raise funds to improve school drinking water access. For example, schools in

Implementing Policies That Promote Free Drinking Water Access and Intake

Although schools and child care programs may develop practices



Potential Sources of Funding to Improve Drinking Water Access in Schools and Child Care Facilities

Federal:

Federal funding, a primary source of grant funding for schools and child care facilities, is allocated through state agencies (e.g., education) to provide funds for a wide range of programs, including health and education-related activities.

- The American Recovery and Reinvestment Act of 2009 increases funding for a wide range of federal programs and may provide funds for schools to improve water-related infrastructure (e.g., plumbing or fixtures that contain lead, dysfunctional drinking fountains).⁷²

State:

State legislatures provide some degree of fiscal support for school and child care facilities, but state funding systems tend to rely on local tax revenue (e.g., local bonds).

State agencies (e.g., education, health) also offer financial support to schools and child care facilities through grants and special funds.

- The New York City Department of Health and Mental Hygiene and Department of Education have assisted public schools with the purchase and installation of water jets.¹⁷
- States can impose a sugar-sweetened beverage excise tax (generally charged to a business selling a product) and earmark the proceeds for programs to prevent and treat obesity.
- West Virginia uses its sugar-sweetened beverage excise tax to fund state medical schools, and Arkansas uses its excise tax on soda syrup to partially support Medicaid.^{73,74}

State/local:

Municipal and state bonds are issued by states, cities, and local governments or agencies. Such bonds can provide a source of revenue to finance construction or renovation of buildings or other infrastructure.

- At the state level, Tennessee passed the Qualified School Construction Bond program, which provides low-interest loans for new construction and rehabilitation of public school facilities, land acquisition for qualified school construction projects, and equipment used in connection with qualified projects.⁷⁵ At a more local level, the Los Angeles Unified School District received funds through the Safe, Healthy Neighborhood Schools Measure to repair plumbing in schools.⁷⁶

Local:

Local governments may also provide a source of funds for schools and child care facilities interested in developing drinking water programs.

- In Oakland, one parent's successful fundraising efforts targeted toward local city council members and community organizations helped fund a hydration station at his children's school.¹⁷

School districts, schools, and child care facilities can allocate funding from existing budgets to water-related programs. Such funding provides a more tangible source of support for improving drinking water access at the school district, school, child care facility, or classroom level.

- In the Oakland Unified School District, the food service director used food service funds to provide free bottled water as a part of the school meal.⁷⁷ California teachers and child care staff report using personal funds to purchase water filtration systems, bottled water, and large water coolers.¹⁷
- A Los Angeles County child care center used funds from its food budget to provide Arrowhead water in each of its facility classrooms.⁷⁸

Private:

Schools and child care facilities can also look to the private sector to obtain support for programs to increase drinking water access and intake among students. Examples of organizations within the private sector that may be able to provide resources include companies that bottle water or manufacture dispensers or water coolers, reusable water bottles, or filters.

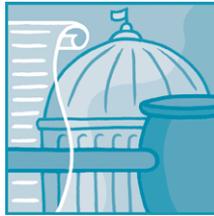
- In Los Angeles, researchers have obtained donations of reusable water bottles from CamelBak for an obesity prevention trial in the Los Angeles Unified School District.⁷⁹
- Utah public schools have obtained free filters for at least 18000 drinking fountains by working with a filter manufacturer.⁸⁰
- A foundation, nonprofit organization, or other nongovernmental entity can make grants to organizations, individuals, or institutions such as schools and child care facilities to improve drinking water access and intake.
- The Environmental Protection Agency maintains a listing of funding sources related to improving drinking water quality in schools and child care facilities (http://www.epa.gov/safewater/schools/pdfs/lead/funding_schools_fundingsources.pdf).⁸¹

that improve the appeal and quality of tap water, policies are necessary to institutionalize such practices. Policies that encourage drinking water access in these

settings are being implemented at both federal and state levels. With the CNA reauthorization and several states passing water-related legislation,^{21,22,84,85} most

schools and child care facilities are now required to make free drinking water available. Maine's 2008 child care licensing rules, for instance, require licensed

facilities to make drinking water available to children.⁸⁴ In 2010, Massachusetts passed legislation requiring public schools to make no-cost, potable drinking water



available to students during the school day.⁸⁵

Key policy interventions may take place at the local level as well through school district wellness policies and child care facilities' operational guidelines. Schools can adopt wellness policies to ensure that drinking water is readily accessible throughout the day. The wellness policy of Pennsylvania's Hazelton School District stipulates provision of water during meal periods and throughout the school day.⁸⁶ In Mississippi, the McComb School District wellness policy allows students to take water anywhere in the school (e.g., classrooms, labs) and encourages teachers to drink only water outside of teachers' lounges (P. Cooper, Chief Executive Officer, Early Childhood and Family Learning Foundation, Louisiana Public Health Institute, oral communication, November 2010).⁸⁷

Child care programs can also implement policies to promote water access and consumption within their facilities. For example, some child care centers in California report having written language in their parent handbooks stipulating that only water and nonfat milk will be offered to children in their facilities.⁷⁸ Funding and other incentives are needed from national, state, and local governments to support child care programs and schools in their efforts to improve drinking water access (see box on page 1375).

Educating Students and Families About the Benefits of Tap Water

In addition to implementing policies that support drinking

water access, schools and child care facilities can educate staff, students, and parents about the importance of drinking more water. Interventions that have improved drinking water access without concurrent education to change beverage preferences have been less effective in increasing water intake and reducing obesity among students.^{6,7,88}

For example, placement of water coolers in the school cafeteria and the distribution of reusable water bottles in Dutch secondary schools did not reduce sales of sugar-sweetened beverages in intervention schools (student beverage intake was not examined).⁸⁸ In comparison, a multifaceted randomized controlled trial of 32 German elementary schools that combined increased drinking water access (installation of cool, filtered fountains, distribution of reusable water bottles to students) with health education (teachers encouraged students to fill up water bottles and conducted drinking water-related lessons) resulted in increased water consumption and a decreased risk of overweight among intervention students.⁷

To our knowledge, few child care-based interventions have focused on increasing drinking water intake among children. During the Soda-Free Summer Campaign in California, the Bay Area Physical Activity and Nutrition Collaborative distributed "Drink More Water Said the Otter" coloring pages, activity worksheets, and books to child care facilities.⁸⁹ Although the effect of this campaign on child care participants was not directly examined, an evaluation of the campaign's impact on the

population at large demonstrated that nearly 50% of individuals who received educational materials reported that they were drinking fewer sugar-sweetened beverages and sports drinks since their exposure to the campaign.⁸⁹

Reducing the Marketing and Sale of Competitive Beverages

Along with improving drinking water availability, schools can decrease competitive beverage access by restricting the sale and advertising of sugar-sweetened beverages. With the child nutrition program reauthorization, the USDA can mandate implementation of nutrition standards for all foods and beverages sold in schools participating in federal meal programs.²¹ Before the reauthorization, states and school districts enacted competitive food and beverage standards.⁹⁰ As of 2010, 28 states and the District of Columbia had adopted such nutrition standards.⁹⁰

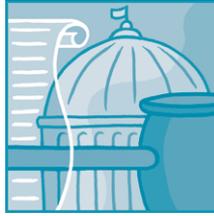
For example, Connecticut permits only the sale of milk, non-dairy milk, 100% fruit and vegetable juices, and plain water in public schools.⁹¹ California's competitive beverage standards ban soda from schools but do allow secondary schools to sell sports drinks that contain added sugar.⁹² At the local level, the Berkeley Unified School District has successfully eliminated competitive beverages from all of its schools.⁹³

Although studies suggest that reducing the availability of sugar-sweetened beverages in schools may decrease students' consumption of these beverages and reduce obesity,^{63,64} no studies, to our

knowledge, have examined the effects of such beverage policies on drinking water intake among students. More research is needed in this area.

States and school districts are also restricting advertising of competitive foods and beverages in schools. Such policies are supported by research suggesting that children are particularly vulnerable to school-based marketing and advertising (e.g., labeling and signage).⁹⁴⁻⁹⁶ The Seattle School Board, for instance, prohibits advertising during school-based television programming on school property or via distribution of vendor-related promotional materials.⁹⁷ Maine prohibits the advertising of foods and beverages that do not meet nutrition standards.⁹⁸ A recent study, however, suggests that this policy is not being fully implemented (85% of schools were not in compliance with the state law).⁹⁹ Most school administrators acknowledged the ban's importance, but they wanted a clear enforcement process, resources to help implement the policy (i.e., staff time, funding), and cooperation from vendors in modifying vending contracts.⁹⁹

Although schools may perceive dependence on sales and advertising revenue, studies suggest that revenue loss is insignificant when schools restrict competitive food and beverage sales and advertising.^{69,100} In fact, some schools have found that their profits remain the same or increase when they sell healthier foods and beverages and involve students in the process.¹⁰¹ Eliminating competitive foods and beverages may even increase sales of school meals. A survey of Texas



vending contracts showed that schools lost more revenue from decreased school meal sales (in part as a result of competitive food sales) than they gained from vending profits.¹⁰²

CONCLUSIONS

Increasing drinking water access in schools is a step in the right direction toward encouraging students' water intake. To effectively shift student preferences from sugary beverages to water, schools and child care facilities should also restrict competitive beverage sales and advertising and develop educational and promotional interventions.

Although challenges must be met, schools and child care programs can address barriers through a combination of school staff, parent, and student-driven grassroots efforts; public-private partnerships; governmental policies; and funding. Future research is needed to examine ways in which to encourage drinking water access, particularly in non-school settings (e.g., homes, child care facilities, and parks and recreation areas). ■

About the Authors

Anisha I. Patel is with the Department of Pediatrics, University of California, San Francisco, and the Philip R. Lee Institute for Health Policy Studies, San Francisco, CA. Karla E. Hampton is with Public Health Law & Policy, Oakland, CA.

Correspondence should be sent to Anisha I. Patel, MD, MSPH, MSHS, Department of Pediatrics, Institute for Health Policy Studies, University of California, San Francisco, 3333 California St, Suite 245, San Francisco, CA 94118 (e-mail: patela@peds.ucsf.edu). Reprints can be ordered at <http://www.ajph.org> by clicking the "Reprints/Eprints" link.

This article was accepted February 6, 2011.

Contributors

A.I. Patel and K.E. Hampton conceptualized the article, reviewed the literature, and jointly wrote the article.

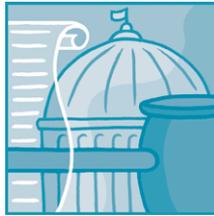
Acknowledgments

This study was funded by the Robert Wood Johnson Healthy Eating Research Program with support by grant KL2 RR024130 from the National Center for Research Resources, National Institutes of Health (NIH), and the Clinical Translational Sciences Institute, Office of the Director, University of California, San Francisco.

Note. The views expressed in this article are solely those of the authors and do not necessarily represent the official views of NIH or the Robert Wood Johnson Foundation.

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