WATER FOR A HEALTHY FUTURE: ACCESS TO DRINKING WATER IN PUBLIC SCHOOLS

A REPORT BY NATHAN BEACOM,
CENTER FOR RURAL AFFAIRS

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November 2020

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This report has been funded in part by the American Heart Association.

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I. INTRODUCTION

Childhood obesity is an ongoing epidemic in the U.S. Approximately 19.3 percent of American youth ages 2 to 19 have a body mass index above the 95th percentile, according to the Centers for Disease Control and Prevention's (CDC) age and sex-specific metrics for healthy body weight.[1]

Percentages of obese individuals increase with age, **and, as of 2018, 42.48 percent of American adults are considered obese.**[2] Childhood obesity is an indicator for obesity later in life, which is associated with an increased risk of serious disease, including diabetes, hypertension, heart disease, stroke, depression, and early mortality in general.[3] In cases of emerging infectious respiratory disease, such as the current coronavirus pandemic, obesity is associated with an increased incidence of serious disease and death.[4]

In Nebraska, more than 30 percent of youth ages 10 to 17 are overweight or obese.[5] The percentage is particularly high among Hispanic and African American populations, and, generally, among lower-income populations.[6]

Recent research indicates access to clean drinking water throughout the day in school settings can be a significant intervention, alongside education and diet change, in preventing childhood obesity.

Among other important vectors for unhealthy weight in children, including a sedentary lifestyle and poor diet, is thought to be the consumption of sugar-sweetened beverages. Such beverages account for the primary source of added sugar in the diets of children and adolescents, and may be a key contributor to the epidemic of unhealthy weight in children.[7,8]

Recent research indicates that access to clean drinking water throughout the day in school settings can be a significant intervention, alongside education and diet change, in preventing childhood obesity. Ready availability of water gives children an alternative to sugar-sweetened beverages.

The aim of this study is to give an overview of the state of childhood obesity in Nebraska, of the evidence for drinking water access as an effective and significant public health intervention, of the existing laws, regulations, and compliance surrounding water access, and, finally, to suggest effective policy interventions to guarantee students ready access to clean drinking water.

1 Hales, Craig M., et al. "QuickStats: Prevalence of Obesity and Severe Obesity Among Persons Aged 2-19 Years—National Health and Nutrition Examination Survey, 1999-2000 through 2017-2018." Centers for Disease Control and Prevention, Morbidity and Mortality Weekly Report, 69:390, April 3, 2020, dx.doi.org/10.15585/mmwr.mm6913a6. Accessed October 2020.

2 Hales, Craig M., et al. "Prevalence of Obesity and Severe Obesity Among Adults: United States, 2017–2018." Centers for Disease Control and Prevention, National Center for Health Statistics, Data Brief, no. 360, February 2020, cdc.gov/nchs/products/databriefs/db360.htm. Accessed October 2020.

3 Lakshman, Rajalakshmi, et al. "Childhood Obesity." Circulation, American Heart Association Journals, Oct. 2, 2012, doi.org/10.1161/CIRCULATIONAHA.111.047738. Accessed October 2020.

4 Tartof, SY., et al. "Obesity and mortality among patients diagnosed with COVID-19: Results from an integrated health care organization." Ann Intern Med, e-publication, Aug. 12, 2020, doi: 10.7326/M20-3742. Accessed October 2020.

5 "Obesity among Nebraska's Youth." Nebraska Department of Health and Human Services Maternal and Child Health, Youth Subcommittee, 2015, dhhs.ne.gov/Title%20V%20Documents/15_Obesity_Youth_MCH_Assessment.pdf. Accessed October 2020.

6 Ibid.

7 Keller, Amélie, and Sophie Bucher Della Torre. "Sugar-Sweetened Beverages and Obesity among Children and Adolescents: A Review of Systematic Literature Reviews." Childhood Obesity, Mary Ann Liebert, Inc., Aug. 4, 2015, doi.org/10.1089/chi.2014.0117. Accessed October 2020.

8 Malik, Vasanti S., et al. "Intake of sugar-sweetened beverages and weight gain: a systematic review." The American Journal of Clinical Nutrition, Oxford Academic, Aug. 1, 2006, doi.org/10.1093/ajcn/84.1.274. Accessed October 2020.

II. CHILDHOOD OBESITY IN NEBRASKA

In Nebraska, 1 in 3 children are considered overweight or obese.[9] Obesity is an indicator for a host of health risks, including, but not limited to, diabetes, coronary artery disease, venous thrombosis, certain cancers, hypertension, heart disease and heart failure, kidney disease, depression, anxiety, and an impaired life trajectory.[10]

A 2015 report from the Nebraska Department of Health and Human Services notes that all key indicators of childhood obesity (e.g. inactivity and food insecurity) have either increased or seen no change in the past 30 years in the state. In the same period, childhood obesity has doubled and adolescent obesity has quadrupled.[11]

Trends have also shown an increase of families and children on the Supplemental Nutrition Assistance Program (SNAP) and other food assistance programs. Food insecurity is associated with unhealthy "feast or famine" eating habits associated with weight gain.[12] Amid these negative changes, the report notes that intake of sugar-sweetened beverages has increased by 500 percent in children in the last 50 years.

While state-level data on race and wealth disparities in unhealthy weight is not available, data from Douglas County and Lincoln Public Schools fits with the national pattern in showing that children from lower-income families, Hispanic or Black families, and families with a single mother are more likely to be overweight than otherwise.[13]

No single intervention will address the obesity epidemic, which will require a multifaceted and multi-level approach that involves everything from education to improving school lunches to easy access to drinking water.

In addition to the chief worry with regard to childhood obesity, namely, the health and well-being of Nebraskans and their communities, the epidemic of unhealthy weight is expensive for the state. On average, obese children miss nine more days of school per year than their peers with healthy weight, which is estimated to cost Nebraska public schools $5.8 million per year.[14] Furthermore, an obese child is estimated to cost an average of $19,000 more in medical expenses over the course of their lifetime.[15] Given that obese individuals tend to be lower-income earners in adulthood, such persons are also less likely to be paying into the systems that support their health needs. All told, the prevalence of obesity places a significant strain on the resources of a state like Nebraska.

No single intervention will address the obesity epidemic, which will require a multifaceted and multi-level approach that involves everything from education to improving school lunches to bringing families out of poverty. Among this slate of tools for approaching the problem, though, public health experts agree, is easy access to drinking water.

9 "Obesity, Food Insecurity, and Physical Inactivity in Nebraska's Children." Nebraska Department of Health and Human Services Maternal and Child Health/Children with Special Health Care Needs, Children Subcommittee, 2015, dhhs.ne.gov/Title%20V%20Documents/11_Overweight_Food%20Insecurity_Physical%20Inactivity_MCH_Assessment.pdf. Accessed October 2020.

10 Lakshman, Rajalakshmi, et al. "Childhood Obesity." Circulation, American Heart Association Journals, Oct. 2, 2012, doi.org/10.1161/CIRCULATIONAHA.111.047738. Accessed October 2020.

11 "Obesity, Food Insecurity, and Physical Inactivity in Nebraska's Children." Nebraska Department of Health and Human Services Maternal and Child Health/Children with Special Health Care Needs, Children Subcommittee, 2015, dhhs.ne.gov/Title%20V%20Documents/11_Overweight_Food%20Insecurity_Physical%20Inactivity_MCH_Assessment.pdf. Accessed October 2020.

12 Ibid.

13 Ibid.

14 Ibid.

15 Finkelstein, Eric Andrew, et al. "Lifetime Direct Medical Costs of Childhood Obesity." Pediatrics, vol. 133, no. 5, pp. 854-862; May 2014, doi: 10.1542/peds.2014-0063. Accessed October 2020.

III. PUBLIC HEALTH RECOMMENDATIONS ON DRINKING WATER ACCESSIBILITY

A growing body of literature indicates what has long been suspected by the public and by researchers alike, namely, that an increased intake of sugar-sweetened beverages is associated with higher incidence of obesity and cardiometabolic disease.[16] A 2014 article in the American Journal of Clinical Nutrition summed up the results of recent studies this way:

> Systematic reviews have been widely used to summarize the best available evidence for clinical and public health policy and decision making. Statements from the American Heart Association, the American Academy of Pediatrics, and the U.S. 2010 Dietary Guidelines technical review committee all call for reductions in intake of sugar-sweetened beverages to prevent obesity and improve health. These recommendations are based on previous systematic reviews and meta-analyses. Despite attempts from the beverage industry to obfuscate the issue by funding biased analyses and reviews, and by providing misleading information to consumers, many regulatory strategies to reduce intake of sugar-sweetened beverages are already in place.[17]

Not mentioned in the summary is an intervention which has gained more attention in recent years—providing an alternative to sugar-sweetened beverages by means of easy water access throughout the day. While the literature on the effectiveness of water-access based interventions for preventing weight gain, like all studies of complex phenomena, are not unanimous, the largest of these studies in the U.S. showed a significant positive effect in the public schools of New York City.[18] A 2017 cost-benefit analysis in Pediatric Obesity found a significant benefit to this relatively inexpensive public health innovation:

- Estimated incremental cost of the school-based water access intervention: $18 per student.
- Estimated incremental benefit of school-based water access: $192 per student.
- Net benefit: $174 per student.
- Lifetime cost saving with national adoption: $13.1 billion.
- Estimated total cost saved per dollar spent was $14.5.[19]

In light of the findings suggesting a positive correlation between in-school water access and lower incidence of obesity and, with the established literature on the various other health benefits of access to clean drinking water for students, the U.S. Department of Agriculture requires schools participating in the National School Lunch Program or School Breakfast Program to provide free water at mealtimes and encourages easy availability of fresh water throughout the day.[20] While its recommendations remain broad, leaving specific implementation to states and localities, the CDC also calls for

16 Malik, Vasanti S., and Frank B. Hu. "Sugar-sweetened beverages and health: where does the evidence stand?" The American Journal of Clinical Nutrition, Oct. 12, 2011, doi.org/10.3945/ajcn.111.025676. Accessed October 2020.

17 Ibid.

18 Schwartz, Amy Ellen, et al. "Effect of a School-Based Water Intervention on Child Body Mass Index and Obesity." JAMA pediatrics, March 2016, doi.org/10.1001/jamapediatrics.2015.3778. Accessed October 2020.

19 An, R., et al. "Projecting the impact of a nationwide school plain water access intervention on childhood obesity: a cost-benefit analysis." Pediatric Obesity, Sept. 22, 2017, doi:10.1111/ijpo.12236. Accessed October 2020.

20 "Increasing Access to Drinking Water in Schools." U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health, 2014, cdc.gov/healthyschools/npao/pdf/water_access_in_schools_508.pdf. Accessed October 2020.

updating plumbing and building codes to promote the stated water access goals.[21]

The American Heart Association (AHA) is more specific. Noting that more than half of school-aged children are regularly under-hydrated, the AHA recommends that state departments of health or other appropriate state agencies should assure that water stations/fountains are placed in highly-used public places, that they are maintained, and that water at the tap is tested annually for cleanliness and safety at schools, libraries, playing fields and parks, and at other government locations at the city, county, state, and special districts levels. Results should be publicized and posted near water fountains and other water access points.[22]

The AHA and other organizations also encourage bottle filling stations so students can carry water throughout the day. A study from the Pacific Institute noted that traditional drinking fountains were a chief touchpoint for infectious bacteria and viruses in school and daycare settings, which provides still more motivation for installing touchless bottle filling fountains.[23]

A study conducted in San Francisco Bay Area middle schools showed a marked increase in water consumption where bottle filling stations with paper cups (paired with education about healthy drinking) were provided as opposed to traditional fountains.[24]

21 "Strategies for Improving Access to Drinking Water in Schools." U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Bridging the Gap, October 2014, bridgingthegapresearch.org/_asset/p5yzxu/Improving_Access_Drinking_Water_Oct_2014.pdf. Accessed October 2020.

22 "Increasing Access to Safe Drinking Water in Schools and Communities Policy Statement." American Heart Association, June 2015, heart.org/-/media/files/about-us/policy-research/policy-positions/healthy-schools-and-childhood-obesity/increasing-access-to-safe-drinking-water-ucm_475974.pdf?la=en. Accessed October 2020.

23 Gleick, Peter, and Rapichan Phurisamban. "Drinking Fountains and Public Health Improving National Water Infrastructure to Rebuild Trust and Ensure Access." Pacific Institute, February 2017, pacinst.org/publication/drinking-fountains-public-health-improving-national-water-infrastructure-rebuild-trust-ensure-access/. Accessed October 2020.

24 Patel, Anisha I., et al. "A Trial of the Efficacy and Cost of Water Delivery Systems in San Francisco Bay Area Middle Schools, 2013." Centers for Disease Control and Prevention, Preventing Chronic Disease, Vol. 13, July 7, 2016, dx.doi.org/10.5888/pcd13.160108. Accessed October 2020.

IV. CURRENT NEBRASKA BUILDING CODES AND SCHOOL COMPLIANCE

In Nebraska, regulations around drinking fountains in public schools must follow the parameters of two separate rules: the International Building Code 2018 and the Uniform Plumbing Code 2018.

Section [P] 2902.5 of the 2018 state building code of Nebraska requires that, in public accommodations, drinking fountains shall not be required to be located in individual tenant spaces provided that public drinking fountains are located within a distance of travel of 500 feet (152.40 meters) of the most remote location in the tenant space and not more than one story above or below the tenant space. Where the tenant space is in a covered or open mall, such distance shall not exceed 300 feet. Drinking fountains shall be located on an accessible route.[25]

For schools, the International Building Code 2018 requires that buildings designed for educational occupancy have 1 drinking fountain per 100 occupants.[26] According to state code, schools are also asked to follow the Uniform Plumbing Code, which requires that buildings designed for educational occupancy shall have one drinking fountain per 150 occupants.[27]

Pursuant to this study, Center for Rural Affairs sent a survey by email to the administrators from every public elementary and middle school in Nebraska with questions pertaining to whether their school facility met the requirements of the International Building Code and Uniform Plumbing Code and whether they met a number of the consensus public health recommendations on drinking water in education settings.

Each of the schools responding was in compliance with requirements of the existing building codes with regard to the number of drinking fountains, with 100 percent of schools surveyed reporting a ratio of 1 drinking fountain to 100 students or lower. Due in large part to an older requirement in the 2009 Uniform Plumbing Code, 100 percent of

25 Nebraska Code 2018, Statute 71-6403, Chapter 29 [P]2902, 2018, Nebraska Legislature.

26 "2018 International Building Code." International Code Council, Chapter 29 Plumbing Systems, Section 2902.1.

27 "2009 Uniform Plumbing Code." Chapter 4, Table 422.1, 2018.

schools also had at least one drinking fountain per floor; a requirement that is absent from the current, 2018 edition of the code.

With respect to the rule for distance to drinking fountains in public accommodations, all but a few of the schools surveyed met the requirement for no more than a 500-foot walk to a drinking fountain. See Figure 1.

The same numbers held true for the presence of bottle filling stations in the responding schools, with comments from administrators indicating such stations were lacking in some older buildings. See Figure 2.

When it comes to an important point of access to water in areas where kids are engaged in sustained physical activity, most schools had water nearby, but the position of drinking fountains in play/sports areas was not uniform. See Figure 3.

The largest discrepancy with respect to the recommendations from the AHA was found in annual inspections for water quality, with just over half of schools responding positively that their fountains were inspected annually for water quality. See Figure 4.

While this survey was sent to every public elementary and middle school administrator in Nebraska, responding schools skewed rural, meaning that this survey gives the best picture of the state of affairs in rural portions of the state. While these schools are likely to have an appropriate ratio of drinking stations to students, given their smaller student bodies, this scenario may not be the case across public schools in places like Lincoln or Omaha.

FIGURE 1. ARE DRINKING FOUNTAINS LOCATED WITHIN 500 FEET OF THE MOST REMOTE CORNER OF THE SCHOOL? (25 RESPONSES)

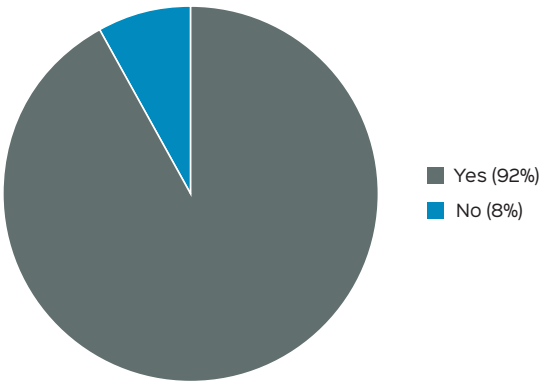


FIGURE 2. DOES YOUR SCHOOL HAVE BOTTLE-FILLING DRINKING FOUNTAINS? (25 RESPONSES)

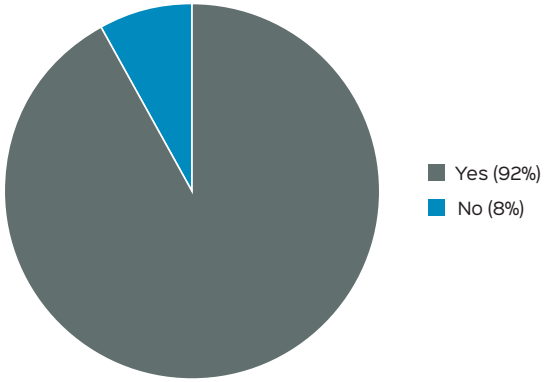


FIGURE 3. IS THERE ACCESS TO WATER IN PLAY/ SPORTS AREAS? (25 RESPONSES)

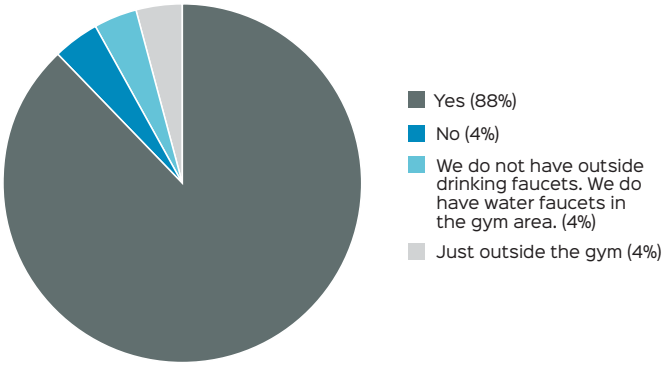
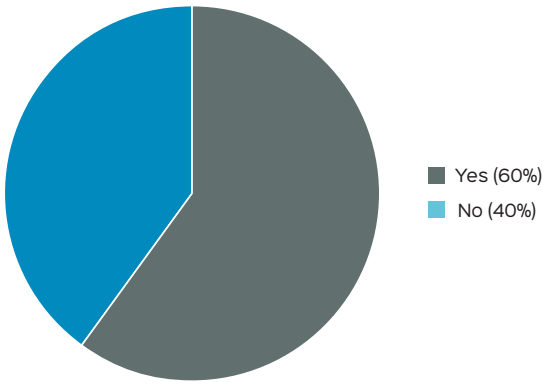


FIGURE 4. ARE DRINKING FOUNTAINS INSPECTED YEARLY FOR WATER QUALITY? (25 RESPONSES)



V. POLICY TOOLS

A. HARMONIZE CURRENT RATIO REQUIREMENTS

To support access to cold, clean, free drinking water for students, and to reap the public health benefits outlined in the preceding sections of this paper, the current building and plumbing codes governing the construction of new school buildings in Nebraska should be amended such that the requirements for the ratio of students to drinking fountains are in agreement. As noted, the International Building Code requires a ratio of 1 drinking fountain for every 100 students while the Uniform Plumbing Code mandates 1 fountain for every 150 students. Given the public health recommendations toward the former ratio, the code should be clear in requiring a 1:100 ratio.

B. RETAIN THE 2009 UNIFORM PLUMBING CODE REQUIREMENT ON FOUNTAINS PER STORY

The current Nebraska building code should correct the oversight in the 2018 Uniform Plumbing Code that neglects to retain a key requirement of the earlier code. Guaranteeing one fountain per floor is a level of accessibility of basic importance for students.

C. REQUIRE WATER ACCESS IN AREAS DEDICATED TO PHYSICAL ACTIVITY AND OTHER ACTIVITIES OUTSIDE OF CLASS

A considerable amount of a student's day occurs outside of the classroom, including physical education, recess, and extracurricular activities. While most survey respondents indicated water availability in sports/play areas, schools should standardize a requirement for drinking water in indoor and outdoor areas where children engage in physical activity. Free water should be made available in cafeteria/dining areas, where students are apt to be in search of things to drink.

D. MAINTENANCE AND SANITATION

Forty percent of responding schools indicated drinking fountains were not inspected annually. To ensure the water available to students is clean and cool, and drinking fountain units are well-functioning, at least one inspection or servicing should be done each school year. Given the potential for lead poisoning and contamination from farm run-off, especially in rural districts, schools must be provided with and follow the Environmental Protection Agency's technical guidance on testing and ensuring water quality. In addition to the fundamental importance of sanitation and hygiene, water offered to students should be cold and clear, such that it creates an attractive option for hydration for students.

E. PHYSICAL ACCESSIBILITY

In keeping with International Building Code requirements for drinking units to be placed within 500 feet of the nearest tenant space, school codes should include a similar requirement for drinking fountains to be placed within 500 feet of the furthest corner of the building. Accommodations should also be made to ensure fountains and filling stations are physically accessible to students of all sizes, abilities, and ages.

F. BOTTLE FILLING STATIONS

In the course of this study, administrators communicated a preference for bottle filling stations, particularly during the current situation with emerging infectious disease. Bottle filling stations are less apt to transfer germs than traditional drinking fountains. While schools face a unique epidemic health challenge now, they also face annual epidemic outbreaks of influenza and other coronavirus-caused respiratory illness (e.g. the common cold). Bottle filling stations also allow students to carry water throughout the day, providing them with healthy hydration when away from a fountain. Because of the pandemic, several schools reported having to shut off their drinking fountains to avoid the spread of germs.

With these factors in mind, schools should be required to phase in bottle filling stations when current drinking fountain units are replaced. Schools should also consider allowing students to carry clear water bottles throughout the day. This has the double benefit of encouraging persistent hydration and giving students hygienic access. State cost-sharing programs could help underfunded districts provide this option to their students. The opportunity to phase bottle filling stations in when old units fail or with new construction will also reduce the burden as compared to an immediate requirement. Some states, such as Minnesota and Tennessee, additionally provide hydration station grants to school districts by way of

state health department or community development programs.[28,29] A second option is the use of gooseneck bottle filling spouts, which can be retrofitted to old units at a much cheaper rate.

G. EDUCATION

Several of these cited studies included recommendations for education to be paired with water access, so students are aware of the benefits to their physical health and mental focus when drinking water. The state could make available educational resources (e.g. posters, signs, talking points for student orientations) to districts within Nebraska.

VI. CONCLUSION

Following these recommendations, which are based on the current state of research and the consensus among public health experts, is a relatively low-cost intervention with the potential for significant benefit to the children and the state of Nebraska. In the conversations and survey conducted, we found that Nebraska public schools are on the right track with regard to providing healthy hydration to students. However, a few changes and added consistency to the current requirements would ensure access to clean, cold, and hygienic drinking water to children and adolescents throughout the day. If these steps are taken, Nebraska would join other Midwestern states in combating chronic illness and improving the economic well-being of the state, to relieve long-term health care costs, and to offer a better quality of life for our children.

28 "2020 Hydration Station Competitive Grant Program Information and Materials, Grant Request for Proposal (RFP)." Minnesota Department of Health, August 2020, health.state.mn.us/communities/environment/water/docs/com/hydstatgrntproginfo.pdf. Accessed October 2020.

29 "Water Bottle Filling Stations Project, Scott County, Tennessee." Tennessee State Government, tn.gov/rural/resources/best-practices/community-development/water-bottle-filling-stations-project.html. Accessed October 2020.

About the Center for Rural Affairs

Established in 1973, the Center for Rural Affairs is a private, nonprofit organization with a mission to establish strong rural communities, social and economic justice, environmental stewardship, and genuine opportunity for all while engaging people in decisions that affect the quality of their lives and the future of their communities.