

CHOICES NATIONAL ACTION KIT:

Promoting Water Consumption in Schools Strategy Report



CHOICES uses cost-effectiveness analysis to compare the costs and outcomes of different policies and programs promoting improved nutrition or increased physical activity in schools, early care and education and out-of-school settings, communities, and clinics. This strategy report describes the projected national population reach, impact on health and health equity, implementation costs, and cost-effectiveness for an effective strategy to improve child health. This information can help inform decision-making around promoting healthy weight. To explore and compare additional strategies, visit the CHOICES National Action Kit at www.choicesproject.org/actionkit.



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SUGGESTED CITATION:

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STRATEGY PROFILE

Describes the estimated benefits, activities, resources, and leadership needed to implement a strategy to improve child health. This information can be useful for planning and prioritization purposes.

Promoting increased water consumption among elementary and middle school students (grades K-8) with the installation of chilled drinking water dispensers in school cafeterias with viable plumbing in schools that participate in the National School Lunch Program.

WHAT POPULATION BENEFITS?

Children in grades K-8 attending schools with viable plumbing that participate in the National School Lunch Program.

WHAT ARE THE ESTIMATED BENEFITS?

Relative to not implementing the strategy

Increase the availability of safe, free drinking water in schools. In turn, this would increase child water consumption and promote healthy child weight.



✓ Increase in availability of safe, free drinking water in schools



✓ Increase in child water consumption



✓ Prevent cases of obesity



✓ Projected to be cost-effective

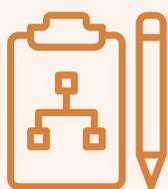


✓ Likely to improve health equity by race, ethnicity, and income

➔ More details available on the CHOICES National Action Kit at choicesproject.org/actionkit

WHAT ACTIVITIES AND RESOURCES ARE NEEDED?

Activities	Resources	Who Leads?
Purchase and install chilled water dispensers	<ul style="list-style-type: none"> Staffing resources necessary for installing water dispensers Costs associated with purchasing water dispensers 	School personnel
Deliver training to school food service directors in cleaning and maintaining the chilled water dispensers	<ul style="list-style-type: none"> Time to develop online training and materials Time for food service directors to access and attend online training 	School district food service staff
Maintain and clean water dispensers	<ul style="list-style-type: none"> Time for food service staff to clean water dispensers Cost of water dispenser filter replacement Time for food service staff to replace filters 	School food service staff
Increase utilities and disposable cup usage	<ul style="list-style-type: none"> Cost of incremental increase in water and electricity usage Cost of increased disposable cup usage 	Schools
Test lead levels in drinking water and remediate issues	<ul style="list-style-type: none"> Cost of lead testing and remediation for school drinking water 	Schools
Conduct administrative review related to drinking water	<ul style="list-style-type: none"> Time for the school district food service director to participate in administrative review Time for the National School Lunch Program administrator to conduct administrative review 	State government



Strategy Modification

Some state and local health agencies added to this strategy the costs of developing and disseminating educational materials on water consumption to further encourage water consumption among students. This would require additional time to develop and disseminate the educational materials and the additional cost of the educational materials.

- See our resource library for relevant peer-reviewed publications, research reports, & briefs at choicesproject.org/resource-library
- Learn more about strategy modifications and CHOICES projections of the strategy Promoting Water Consumption in Schools for US states:
 - [California](#)
 - [Massachusetts](#)
- Learn more about the evidence for the strategy Promoting Water Consumption in Schools in the CHOICES peer-reviewed publication: [Kenney et al. 2019. Obesity](#)

Adapted from CHOICES Strategy Profile: Promoting Water Consumption in Schools. CHOICES Project Team at the Harvard T.H. Chan School of Public Health, Boston, MA; April 2022.

NATIONAL RESULTS

Projected national population reach, impact on health behaviors and prevention of excess weight gain, implementation costs, and health care cost savings for the strategy. These national results may help inform your organization's decision-making around promoting healthy weight.

DESCRIPTION	Promoting increased water consumption among students in grades K-8 with the installation of chilled drinking water dispensers in school cafeterias
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OUTCOME	Mean (95% UI)*
BEHAVIOR CHANGE PER PERSON <i>Change in health behavior per person in the first year</i>	44 more servings of water (18; 69) <i>12-oz servings, in the first year</i>
COST PER PERSON <i>Average annualized cost per person to implement the strategy over the model period</i>	\$2.18 (\$1.40; \$2.95) See Cost Results
POPULATION REACH <i>Reach over the model period</i>	58,000,000 (57,000,000; 59,000,000)
OBESITY PREVENTED <i>Cases of obesity prevented in the final year</i>	109,000 (57,300; 170,000)
CHILD OBESITY PREVENTED <i>Cases of child obesity prevented in the final year</i>	92,800 (47,600; 148,000)
HEALTH EQUITY IMPACT <i>Impact on obesity-related health equity in the final year</i>	Likely to improve health equity by race, ethnicity, & income See Health Equity Indicators
QUALITY-ADJUSTED LIFE YEARS (QALYS) GAINED <i>Quality-adjusted life years (QALYs) gained (totals over the model period)</i>	33,800 (17,900; 50,900)
OBESITY YEARS PREVENTED <i>Years with obesity prevented (totals over the model period)</i>	763,000 (403,000; 1,200,000)
HEALTH CARE COSTS SAVED PER \$1 INVESTED <i>Total health care costs saved per total intervention costs over the model period</i>	\$0.07 (\$0.02; \$0.15)
COST PER QALY GAINED <i>Net cost per quality-adjusted life year (QALY) gained (totals over the model period)</i>	\$35,000 (\$16,900; \$75,500)

Projections for the model period 2022-2031 (10 years, inclusive of the start and end years).

Costs are in 2019 dollars and discounted at 3% annually.

*Results displayed are the mean and 95% uncertainty interval (UI). CHOICES calculates 95% uncertainty intervals by running the model 1,000 times and reporting the range (95% of estimates, centered on the mean) of projected outcomes that account for uncertainty from data sources and population projections.

- ✓ Explore our [User Guide](#) for more information about the CHOICES National Action Kit at choicesproject.org/action-kit-user-guide
- ✓ Learn more about CHOICES Methods at choicesproject.org/methods
- ✓ Find definitions of each modeled outcome in the [Glossary \(p.12\)](#) at choicesproject.org/action-kit-glossary

COST RESULTS

Describes the estimated costs by activity and payer needed to implement a strategy to improve child health nationally. This information can be useful for planning and prioritization purposes.

This report includes estimates of the implementation costs of promoting water consumption in schools if implemented in each state in the United States. Costs are estimated from a societal perspective, meaning costs needed to implement the strategy are included regardless of who pays or whether the costs are budgetary or opportunity costs.

Average Annual Strategy Implementation Cost by Activity and Payer				
Activity	Resources	Cost per Person†	Payer	Percent of Total Cost
Purchase and install chilled water dispensers	<ul style="list-style-type: none"> Staffing resources necessary for installing water dispensers Costs associated with purchasing water dispensers 	\$0.35	School district	16%
Deliver training to school food service directors in cleaning and maintaining the chilled water dispensers	<ul style="list-style-type: none"> Time to develop online training and materials Time for food service directors to access and attend online training 	\$0.002	Federal government; School district	<1%
Maintain and clean water dispensers	<ul style="list-style-type: none"> Time for food service staff to clean water dispensers Cost of water dispenser filter replacement Time for food service staff to replace filters 	\$1.14	School	52%
Increase utilities and disposable cup usage	<ul style="list-style-type: none"> Cost of incremental increase in water and electricity usage Cost of increased disposable cup usage 	\$0.65	School	30%
Test lead levels in drinking water and remediate issues	<ul style="list-style-type: none"> Cost of lead testing and remediation for school drinking water 	\$0.03	School	1%
Conduct administrative review related to drinking water	<ul style="list-style-type: none"> Time for the school district food service director to participate in administrative review Time for the National School Lunch Program administrator to conduct administrative review 	\$0.002	School district; State government	<1%
TOTAL	--	\$2.18	--	100%

Costs are in 2019 dollars and discounted at 3% per year. Sums of estimates in columns may not equal Total due to rounding.

†Average annualized cost per person to implement the strategy over the model period 2022-2031 (10 years).

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Average Annual Strategy Implementation Cost by Payer and Cost Type			
Payer	Cost per Person†		
	All Costs (% of Total)	Budgetary Costs (% of All Costs by Payer)	Opportunity Costs (% of All Costs by Payer)
Federal government	<\$0.001 (<1%)	\$0 (0%)	<\$0.001 (100%)
State government	\$0.002 (<1%)	\$0 (0%)	\$0.002 (100%)
Local government	--	--	--
School district	\$0.34 (16%)	\$0.34 (99%)	\$0.003 (1%)
School	\$1.84 (84%)	\$0.70 (38%)	\$1.14 (62%)
Family/Individual	--	--	--
Industry	--	--	--
Nonprofit	--	--	--
Health care	--	--	--
TOTAL	\$2.18 (100%)	\$1.04 (48%)	\$1.14 (52%)

Costs are in 2019 dollars and discounted at 3% per year. Sums of estimates in columns may not equal Total due to rounding.

†Average annualized cost per person to implement the strategy over the model period 2022-2031 (10 years).

→ To compare the costs and impacts of strategies, use the [CHOICES National Action Kit comparison builder](#). The strategy implementation cost tables included in this report may provide information useful for planning purposes.

DEFINITIONS

All costs include budgetary and opportunity costs.

Budgetary costs refer to the actual financial costs incurred.

Opportunity costs refer to the value of what you have to give up in order to choose something else. For example, if an annual professional development training for bullying prevention is replaced with a training for active physical education, there is no budgetary impact, but costs for teachers to attend the training are considered an opportunity cost. The opportunity cost of their time is included in a cost analysis from a societal perspective.

HEALTH EQUITY INDICATORS

Describes the projected impact of implementing a strategy nationally on health equity by race, ethnicity, and income.

Every person deserves access to healthy foods and drinks and opportunities to be physically active, which can help them grow up and live at a healthy weight. However, obesity levels vary by race, ethnicity, and income. Nationally, current and future projected obesity levels are highest among Black or African American and Hispanic or Latino race and ethnicity groups and populations with low household incomes.¹ These disparities are driven by many forces, including commercial determinants leading to increased intake of highly processed and marketed foods and drinks, as well as structural racism and social and economic determinants of health.²⁻⁴ Effective policy and programmatic strategies promoting improved nutrition and increased physical activity can reduce health disparities and improve health equity.

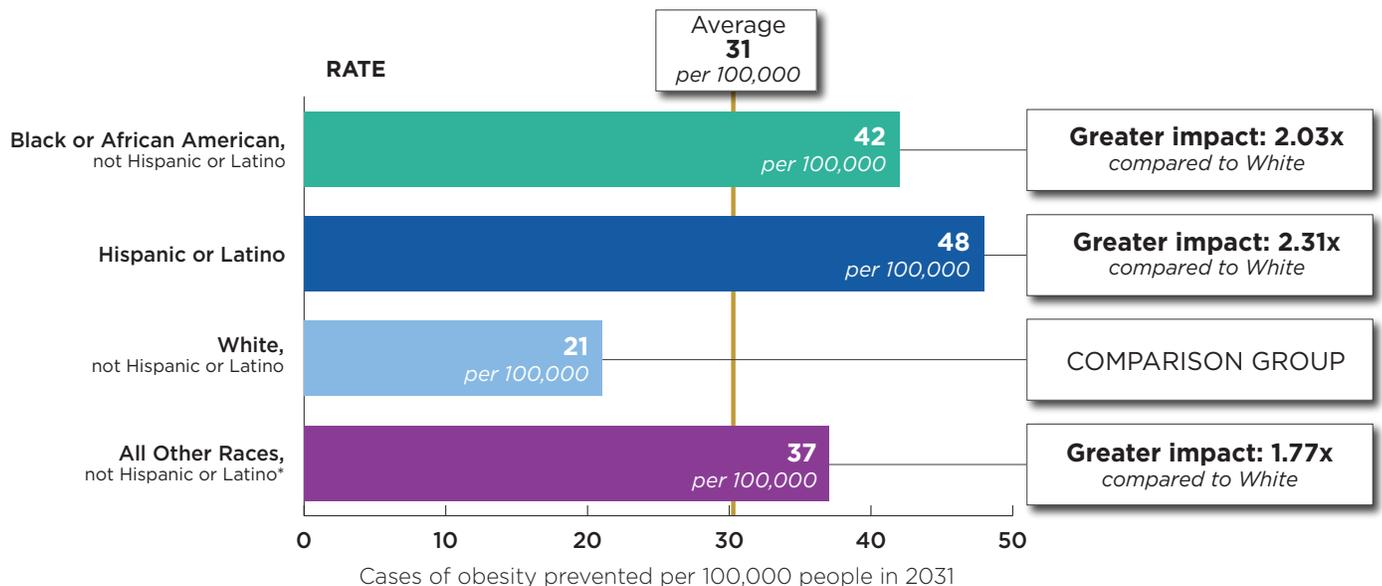
KEY TAKEAWAYS

If implemented over 10 years (2022-2031), this strategy is projected to:

- ✓ Prevent 109,000 cases of obesity in 2031
- ✓ Prevent cases of obesity in all race, ethnicity, and income groups
- ✓ Improve health equity by race, ethnicity, and income

Learn more about CHOICES methods for projecting health equity impacts at choicesproject.org/methods/healthequity

Comparative projected impact of the strategy by race and ethnicity



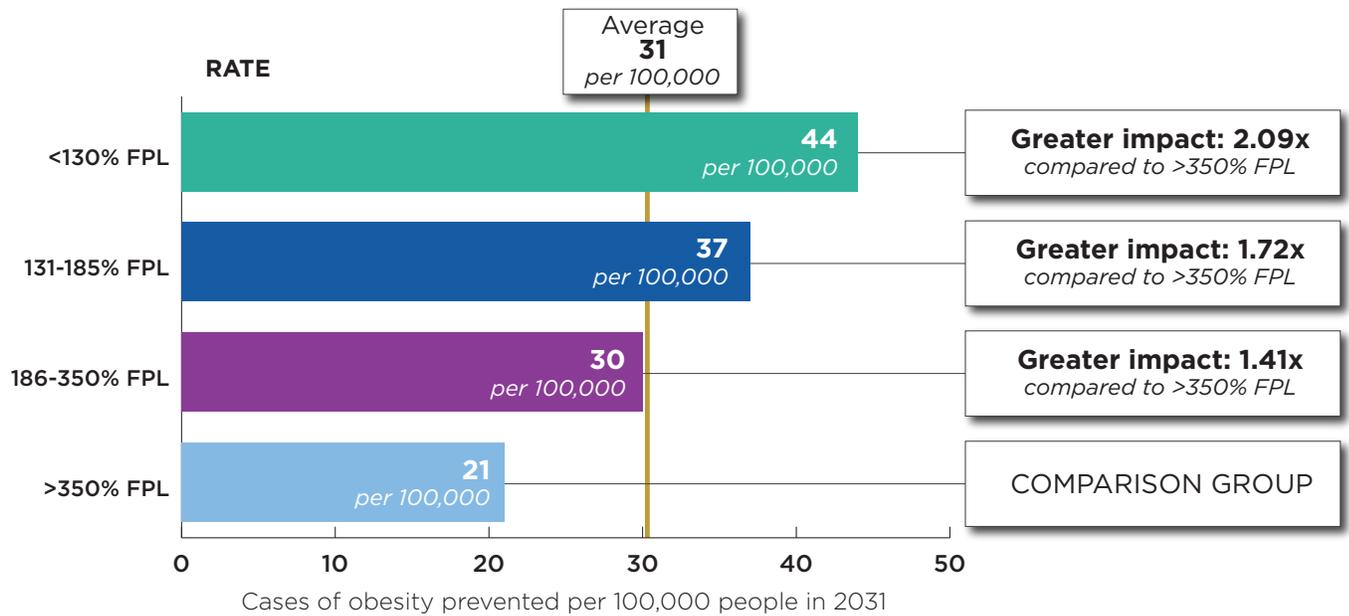
*All Other Races includes people who identify as American Indian/Alaska Native, Asian, Native Hawaiian or Pacific Islander, Multi-racial, or another race or ethnicity not represented in the categories shown. While each of these groups represent distinct populations with differences in health opportunities, risk, and outcomes, they are summarized together due to limited data in national- and state-level surveillance systems.



The Black or African American and Hispanic or Latino populations are projected to experience preventive benefits that are 2.03 and 2.31 times greater compared to the White population. *The comparative impact in each population group compared to the population average is provided in a table on [page 9](#).*

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Comparative projected impact of the strategy by household income as a percentage of the federal poverty level (FPL)



Populations with lower household incomes (185% FPL or less) are projected to experience preventive benefits that are 1.41-2.09 times greater compared to populations with the highest income (>350% FPL). *The comparative impact in each population group compared to the population average is provided in a table on [page 9](#).*

How is this strategy expected to impact health equity?

All students deserve access to safe, clean, and appealing drinking water. Ensuring easy access to appealing drinking water gives students a healthier alternative to sugary drinks, like sweetened fruit drinks, sports drinks, and soda. In the U.S., most youth have reported drinking at least one sugar-sweetened beverage on any given day.⁵ Students drink more water when schools provide access to water at lunch at no charge.⁶ Adequate water consumption supports well-being and cognitive function.⁷ Hispanic or Latino youth report less availability of drinking water fountains in schools,⁸ and Black or African American youth are less likely to be adequately hydrated compared with White, not Hispanic or Latino, youth.⁹ Improving school water access may help more students grow up at a healthy weight^{10,11} and could promote health equity. One strategy to promote water consumption among elementary and middle school students (grades K-8) is through the installation of chilled drinking water dispensers in school cafeterias. Several states and cities have successfully enacted policies or implemented programs that require or fund installation of water dispensers in schools, including Arkansas,¹² California,^{13,14} New Hampshire,¹⁵ New York City,¹⁶ Rhode Island,¹⁷ and West Virginia.¹⁸ Ensuring access to a school environment with appealing drinking water access can give students what they need to grow up healthy.

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Projected impact of the strategy by race, ethnicity and income, mean (95% UI)^a

	OBESITY PREVENTED	OBESITY PREVENTED PER 100,000	COMPARATIVE IMPACT^b	
	<i>Cases of obesity prevented in the final year</i>	<i>Cases of obesity prevented per 100,000 people in the final year</i>	<i>Ratio of obesity prevented per 100,000</i>	
Race and Ethnicity			<u>Compared with White, not Hispanic or Latino</u>	<u>Compared with Population Average</u>
Overall	109,000 (57,300; 170,000)	31 (16; 48)	--	1.00 (Reference) N/A
Black or African American, not Hispanic or Latino	19,300 (9,900; 31,000)	42 (22; 68)	2.03 (1.33; 2.75) >99% likelihood of greater impact	1.38 (1.04; 1.71) 99% likelihood of greater impact
Hispanic or Latino	35,200 (17,800; 55,800)	48 (24; 77)	2.31 (1.64; 3.23) >99% likelihood of greater impact	1.58 (1.25; 1.93) >99% likelihood of greater impact
White, not Hispanic or Latino	43,300 (22,900; 69,100)	21 (11; 33)	1.00 (Reference) N/A	0.68 (0.58; 0.78) >99% likelihood of lesser impact
All Other Races, not Hispanic or Latino ^c	11,700 (5,920; 19,300)	37 (19; 61)	1.77 (1.38; 2.21) >99% likelihood of greater impact	1.21 (0.92; 1.48) 90% likelihood of greater impact
Household Income as a percentage of the federal poverty level (FPL)			<u>Compared with >350% FPL</u>	<u>Compared with Population Average</u>
Overall	109,000 (57,300; 170,000)	31 (16; 48)	--	1.00 (Reference) N/A
<130% FPL	37,900 (20,200; 59,500)	44 (24; 70)	2.09 (1.74; 2.48) >99% likelihood of greater impact	1.45 (1.32; 1.60) >99% likelihood of greater impact
131-185% FPL	13,600 (6,780; 22,100)	37 (18; 60)	1.72 (1.40; 2.09) >99% likelihood of greater impact	1.20 (1.02; 1.39) 98% likelihood of greater impact
186-350% FPL	27,600 (14,500; 43,600)	30 (16; 47)	1.41 (1.20; 1.65) >99% likelihood of greater impact	0.98 (0.87; 1.08) 64% likelihood of lesser impact
>350% FPL	30,400 (16,000; 47,900)	21 (11; 33)	1.00 (Reference) N/A	0.69 (0.63; 0.77) >99% likelihood of lesser impact

Projections for the model period 2022-2031 (10 years, inclusive of the start and end years).

^aResults displayed are the mean and 95% uncertainty interval (UI). CHOICES calculates 95% uncertainty intervals by running the model 1,000 times and reporting the range (95% of estimates, centered on the mean) of projected outcomes that account for uncertainty from data sources and population projections.

^bRatio that compares cases of obesity prevented per 100,000 in each population group with the reference group. When the value is greater than 1.0 for a population group, we project a greater health benefit for that group compared with the reference group. When the value is less than 1.0, we project a lesser health benefit. Note: Ratios are sensitive to extremely high and low rates, so they should be interpreted in the context of the absolute rates, represented by Obesity Prevented per 100,000 here. Results may differ if estimating absolute rates and relative impacts among children only. Likelihood of greater or lesser impact compared with the reference group is estimated based on running the model 1,000 times.

^cAll Other Races includes people who identify as American Indian/Alaska Native, Native Hawaiian or Pacific Islander, Multi-racial, or another race or ethnicity not represented in the categories shown. While each of these groups represent distinct populations with differences in health opportunities, risks, and outcomes, they are summarized together due to limited data in national- and state-level surveillance systems.

STRATEGY DETAILS & MODELING METHODS

Describes the reach, effect, and cost assumptions used to make national projections for the strategy, and provides links to additional resources related to the strategy.

STRATEGY

The CHOICES model for nationwide implementation of a strategy to promote drinking water for children would include installing chilled water dispensers in school cafeteria settings in U.S. schools. The strategy involves chilled, easy-to-use water dispensers that can be used to fill cups or bottles on school cafeteria lunch lines.¹⁰ Installation of chilled water dispensers has been implemented on a wide scale in the New York City Public schools, where they were found to be significantly associated with reductions in BMI z-score over time. CHOICES modeled the installation of chilled water dispensers in school cafeterias at schools with viable plumbing participating in the National School Lunch Program (NLSP) serving students in grades K-8.¹¹ Activities and costs associated with this intervention include: training school food service directors, purchasing and installing the dispensers at the start of the intervention, ongoing cleaning and maintenance of the dispensers, increased tap water usage at the school, increased electricity usage, disposable cup usage, and ongoing lead testing and remediation.¹¹ Resources from the Centers for Disease Control and Prevention,¹⁹ Water in Schools,²⁰ and the National Drinking Water Alliance²¹ provide information regarding implementation, including steps that schools might need to take to create community/parent buy-in, test water for lead, conduct lead remediation, and tailor water promotional materials.

REACH

This strategy would reach children in grades kindergarten through 8 (ages 5-14) who attend public elementary and middle schools in the U.S. that participate in the National School Lunch Program, have viable plumbing with potable tap water, and have not already installed chilled water dispensers in school cafeterias.¹¹ Existing statewide or citywide policies and programs that require or fund installation of water dispensers in schools and the number of schools reached as of January 2023 were identified based on web searches. We identified policies in seven states (Arkansas, California, Kentucky, Louisiana, New Hampshire, Rhode Island, and West Virginia) and programs in 12 states (California, Connecticut, Hawaii, Illinois, Iowa, Massachusetts, Minnesota, North Carolina, Ohio, Rhode Island, Tennessee, and Washington) and 2 cities (New York City and Philadelphia).

This strategy would have a 10-year reach of 58.0 million children if implemented nationwide.

EFFECT

CHOICES estimates that in 2031, 109,000 cases of obesity would be prevented.

The population reached by this intervention would see a 1-year average BMI change of -0.081.¹¹

COST

Implementation of this strategy involves accounting for the costs of training school food service directors, purchasing, installing, cleaning, and maintaining the dispensers, increased tap water, electricity, and disposable cup usage, and ongoing lead testing and remediation. Installing this strategy in the absence of external funding would require schools to invest about \$2,500 per unit as well as to train staff in maintaining and cleaning the units.¹¹

Installation of chilled water dispensers on school lunch lines would incur an average annual cost per child of \$2.18.

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CHOICES METHODS

CHOICES uses cost-effectiveness analysis to compare the costs and outcomes of different policies and programs promoting improved nutrition or increased physical activity in schools, early care and education and out-of-school settings, communities, and clinics. Our methods include:

- **Key partner consultation:** Working with key partners & researchers to identify the most promising programs & policies for evaluation
- **U.S. population model:** Building a computer model of the U.S. population & projecting Body Mass Index (BMI) changes & health outcomes over time
- **Systematic reviews & meta-analyses:** Synthesizing scientific literature to estimate the likely effects of promising obesity prevention interventions on BMI & physical activity
- **Cost-effectiveness analysis:** Integrating information on the economic costs & health effects of interventions, utilizing a structured & transparent process
- **Health equity lens:** Projecting the impact of effective intervention strategies on population health and health equity

Learn more about CHOICES methods at choicesproject.org/methods.

WHY DOES CHOICES USE BMI AS A POPULATION HEALTH INDICATOR?

CHOICES focuses on programs and policies that can help reverse the societal and environmental conditions that drive increases in excess body weight and that emphasize healthy eating, improved physical activity, and reduced screen viewing. Excess body weight is associated with reduced quality of life and increased risk for chronic diseases like diabetes, heart disease, and cancers,²² greater healthcare expenditures,²³ and increased mortality risk.²⁴ Obesity is a category of excess weight defined by body mass index (BMI), which is calculated as the ratio of a person's weight (kg) to their height squared (m²).²⁵ Obesity is a chronic health condition recognized by the National Institutes of Health, the American Medical Association, Medicare, and Medicaid.

BMI is a useful population health indicator, although it does have limitations. BMI has been shown to be a good measure of individual-level adiposity, correlating highly ($r=0.8$) with gold standard measures of percent body fat, among adults, children and adolescents and for different gender and racial and ethnic groups.^{26,27} BMI is relatively simple to collect and easy to calculate, and it is used widely in medical and scientific research to measure population health.

However, weight stigma occurs when people are blamed for their weight. Weight stigma can increase a person's risk of engaging in unhealthy eating behaviors and low levels of physical activity and can reduce both the quality of health care a person receives and their utilization of care, all undermining public health.²⁸ CHOICES evaluates the cost-effectiveness of policies and programs aimed at improving nutrition and physical activity environments, promoting related health behaviors, and promoting a healthy weight across all population groups and BMI levels.

For Additional Information

Contact the CHOICES team at choicesproject@hsph.harvard.edu for additional information about model assumptions.

Kenney EL, Craddock AL, Long MW, Barrett JL, Giles CM, Ward ZJ, Gortmaker SL. Cost-effectiveness of water promotion strategies in schools for preventing childhood obesity and increasing water intake. 2019 Dec. doi:10.1002/oby.22615. Available at: <https://pubmed.ncbi.nlm.nih.gov/31746555>

For more information about this strategy, see:

Elbel B, Mijanovich T, Abrams C, et al. A water availability intervention in New York City public schools: influence on youths' water and milk behaviors. *Am J Public Health* 2015;105:365-372. doi:10.2105/AJPH.2014.302221

Schwartz AE, Leardo M, Aneja S, Elbel B. Effect of a school-based water intervention on child body mass index and obesity. *JAMA Pediatr* 2016;170:220-226. doi:10.1001/jamapediatrics.2015.3778

CHOICES NATIONAL ACTION KIT: MODELED OUTCOMES GLOSSARY

Provides definitions for each modeled output displayed in the National Results table.

Modeled Output	Definition
<p>BEHAVIOR CHANGE PER PERSON* <i>Change in health behavior per person in the first year</i></p>	<p>The change in health behavior a person is projected to have after a strategy is put in place. Health behavior changes may include decreases in sugary drink intake, increases in physical activity, decreases in time spent watching TV, or increases in water intake. Behavior change per person is reported when the strategy aims to improve a specific health behavior and data are available to project how much a behavior would improve.</p> <p><i>Averaged across people who actually receive the strategy.</i></p>
<p>COST PER PERSON <i>Average annualized cost per person to implement the strategy over the model period</i></p>	<p>The average annualized cost to implement the strategy over the model period (e.g., 10 years) per person reached over the model period. This includes cost by all payers (government, private sector, non-profit, individual/family).</p> <p>See the Cost Results for a breakdown of implementation costs by activity and payer.</p> <p><i>Averaged across people in the intended population of focus where the strategy is adopted (that is, people who are eligible based on age, income, geographic area, and/or participation in the setting or program of focus, and who could potentially receive the strategy based on estimated adoption rates).</i></p>
<p>POPULATION REACH* <i>Reach over the model period</i></p>	<p>The number of people reached by the strategy over the model period.</p> <p><i>Includes all people in the intended population of focus where the strategy is adopted (that is, people who are eligible based on age, income, geographic area, and/or participation in the setting or program of focus, and who could potentially receive the strategy based on estimated adoption rates).</i></p>
<p>OBESITY PREVENTED* <i>Cases of obesity prevented in the final year</i></p>	<p>In the final year of the model, the difference in the projected number of people with obesity if the strategy were not put in place and the projected number of people with obesity if the strategy were put in place.</p>
<p>CHILD OBESITY PREVENTED* <i>Cases of child obesity prevented in the final year</i></p>	<p>In the final year of the model, the difference in the projected number of children with obesity if the strategy were not put in place and the projected number of children with obesity if the strategy were put in place.</p>
<p>HEALTH EQUITY IMPACT* <i>Impact on obesity-related health equity in the final year</i></p>	<p>The projected impact on differences in obesity levels between population groups defined by race, ethnicity, and by income. Learn more about our methods for projecting health equity impacts.</p>
<p>QUALITY-ADJUSTED LIFE YEARS (QALYS) GAINED <i>Quality-adjusted life years (QALYs) gained (totals over the model period)</i></p>	<p>The difference in total number of quality-adjusted life years (QALYs) in the population over the model period if the strategy were not put in place compared with if the strategy were put in place. A QALY is a measure of both the quantity and quality of life. CHOICES estimates the QALYs gained as a measure of how much implementing a strategy to prevent future excess weight gain could improve the quantity and quality of life for a population. See our User Guide for more information about QALYs.</p>
<p>OBESITY YEARS PREVENTED <i>Years with obesity prevented (totals over the model period)</i></p>	<p>The difference in total number of person-years lived without obesity if the strategy were not put in place compared with if the strategy were put in place. This measure sums up portions of years lived without obesity across all the persons in the model, comparing the result if the strategy were put in place or not.</p>
<p>HEALTH CARE COSTS SAVED PER \$1 INVESTED <i>Total health care costs saved per total intervention costs over the model period</i></p>	<p>The amount avoided in health care cost related to excess weight for every dollar spent to implement the strategy over the model period.</p> <p>See the Cost Results for a breakdown of implementation costs by activity and payer.</p>
<p>COST PER QALY GAINED <i>Net cost per quality-adjusted life year (QALY) gained (totals over the model period)</i></p>	<p>The total cost impact to improve population health in terms of quality-adjusted life years gained. Cost per QALY gained is a measure of cost-effectiveness. It includes costs to implement a strategy, cost savings due to efficiencies when implementing a strategy, and health care cost savings related to reductions in excess weight after a strategy is implemented. See our User Guide for more information about QALYs and cost per QALY gained.</p>

All metrics reported for the population over the model period and discounted at 3% per year, unless otherwise noted. Definitions for these modeled outputs are all written assuming that an intervention is implemented.

* Not discounted.

REFERENCES

1. Ward ZJ, Bleich SN, Cradock AL, Barrett JL, Giles CM, Flax C, Long MW, Gortmaker SL. Projected U.S. State-Level Prevalence of Adult Obesity and Severe Obesity. *N Engl J Med*. 2019 Dec 19;381(25):2440-2450.
2. Kumanyika SK. A Framework for Increasing Equity Impact in Obesity Prevention. *Am J Public Health*. 2019 Oct;109(10):1350-1357.
3. Bleich SN, Ard JD. COVID-19, Obesity, and Structural Racism: Understanding the Past and Identifying Solutions for the Future. *Cell Metab*. 2021 Feb 2;33(2):234-241.
4. Swinburn BA, Sacks G, Hall KD, McPherson K, Finegood DT, Moodie ML, Gortmaker SL. The global obesity pandemic: shaped by global drivers and local environments. *Lancet*. 2011 Aug 27;378(9793):804-14.
5. Dai J, Soto MJ, Dunn CG, Bleich SN. Trends and patterns in sugar-sweetened beverage consumption among children and adults by race and/or ethnicity, 2003-2018. *Public Health Nutr*. 2021 Jun;24(9):2405-2410. doi: 10.1017/S1368980021001580. Epub 2021 Apr 12.
6. Bogart LM, Babey SH, Patel AI, Want P, Schuster MA. Lunchtime school water availability and water consumption among California adolescents. *J Adolesc Health*. 2016; 58(1):98-103, doi: 10.1016/j.jadohealth.2015.09.007.
7. Popkin BM, D'Anci KE, Rosenberg IH. Water, hydration, and health. *Nutr Rev*. 2010 Aug;68(8):439-58.
8. Onufrak SJ, Park S, Wilking C. Student-reported school drinking fountain availability by youth characteristics and state plumbing codes. *Prev Chronic Dis* 2014; 11: E60, doi: 10.5888/pcd11.130314.
9. Kenney EL, Long MW, Cradock AL, Gortmaker SL. Prevalence of inadequate hydration among U.S. children and disparities by gender and race/ethnicity: National Health and Nutrition Examination Survey, 2009-2012. *American Journal of Public Health*. 2015; 105(8): e113-8, doi: 10.2105/AJPH.2015.302572.
10. Schwartz AE, Leardo M, Aneja S, Elbel B. Effect of a School-Based Water Intervention on Child Body Mass Index and Obesity. *JAMA Pediatr*. 2016; 170(3):220-226. Doi:10.1001/jamapediatrics.2015.3778.
11. Kenney EL, Cradock AL, Long MW, et al. Cost-Effectiveness of Water Promotion Strategies in Schools for preventing Childhood Obesity and Increasing Water Intake. *Obesity*. 2019;27(12):2037-2045. doi:10.1002/oby.22615
12. State of Arkansas, 93rd General Assembly, Regular Session, 2021. Act 775 of the Regular Session: An Act Concerning Water Bottle Filling Stations. <https://www.arkleg.state.ar.us/Home/FTPDocument?path=%2FACTS%2F2021R%2FPublic%2FACT775.pdf>
13. California Assembly Bill 2638, 2021-2022. <https://legiscan.com/CA/text/AB2638/2021>
14. California Water Boards. Drinking Water For Schools Grant Program. https://www.waterboards.ca.gov/water_issues/programs/grants_loans/schools
15. N.H. Rev. Stat. Section 200:11-b. Water Bottle Filling Stations in Schools. <https://casetext.com/statute/new-hampshire-revised-statutes/title-15-education/chapter-200-health-and-sanitation/section-20011-b-water-bottle-filling-stations-in-schools>
16. Elbel B, Mijanovich T, Abrams C, et al. A water availability intervention in New York City public schools: influence on youths' water and milk behaviors. *Am J Public Health* 2015;105:365-372
17. Rhode Island General Law Section 16-21-37 (2022). Water bottle filling stations in new and renovated schools. <https://law.justia.com/codes/rhode-island/2022/title-16/chapter-16-21/section-16-21-37>
18. West Virginia Senate Bill 246, 2022 Regular Session. https://www.wvlegislature.gov/Bill_Status/bills_history.cfm?INPUT=246&year=2022&sessiontype=RS
19. Centers for Disease Control and Prevention. Increasing Access to Drinking Water in Schools. Atlanta GA: US Dept. of Health and Human Services; 2014. Available at: https://www.cdc.gov/healthyschools/npao/pdf/water_access_in_schools_508.pdf
20. Grummon, A., Hampton, K.E., Oliva, A., Brindis, C.D., Patel A.I. Water Works: A Guide to Improving Access to and Consumption of Water in Schools to Improve Health and Support Learning. (2014). Available at: <http://waterinschools.org/pdfs/WaterWorksGuide2014.pdf> <http://waterinschools.org/wp-content/uploads/2015/06/WaterWorksGuide2014.pdf>
21. National Drinking Water Alliance. Nutrition Policy Institute. University of California Agriculture and National Resources. Available at: <https://www.drinkingwateralliance.org>
22. Centers for Disease Control and Prevention. Consequences of Obesity. Accessed September 13, 2023 at: <https://www.cdc.gov/obesity/basics/consequences.html>
23. Ward ZJ, Bleich SN, Long MW, Gortmaker SL. Association of body mass index with health care expenditures in the United States by age and sex. *PLoS ONE*. 2021 Mar;16(3): e0247307. doi:10.1371/journal.pone.0247307.
24. Ward ZJ, Willett WC, Hu FB, Pacheco LS, Long MW, Gortmaker SL. Excess mortality associated with elevated body weight in the USA by state and demographic subgroup: A modelling study. *eClinicalMedicine*. 2022 Apr;48. doi:10.1016/j.eclinm.2022.101429
25. Centers for Disease Control and Prevention. Obesity Basics. Accessed September 13, 2023 at: <https://www.cdc.gov/obesity/basics/index.html>
26. Woolcott OO, Bergman RN. Relative fat mass (RFM) as a new estimator of whole-body fat percentage – A cross-sectional study in American adult individuals. *Sci Rep*. 2018 Jul 20;8(1):10980.
27. Woolcott OO, Bergman RN. Relative Fat Mass as an estimator of whole-body fat percentage among children and adolescents: A cross-sectional study using NHANES. *Sci Rep*. 2019 Oct 24;9(1):15279.
28. Puhl RM, Heuer CA. Obesity stigma: Important considerations for public health. *Am J Public Health*. 2010;100(6):1019-1028. doi: org/10.2105/AJPH.2009.159491