

CHOICES NATIONAL ACTION KIT:

New Opportunities for Healthy Afterschool Programs 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.



TABLE OF CONTENTS

Page 2 Strategy Profile | Describes the estimated benefits, activities, resources, and leadership needed to implement the strategy.

Page 4 National Results | Displays the projected national population reach, impact on health behaviors and prevention of excess weight gain, implementation costs, and cost-effectiveness of the strategy.

Page 5 Cost Results | Describes the estimated costs by activity and payer needed to implement the strategy nationally.

Page 7 Health Equity Indicators | Describes the projected impact of implementing the strategy nationally on health equity by race, ethnicity, and income.

Page 10 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.

Page 12 CHOICES National Action Kit: Modeled Outcomes Glossary | Provides definitions for each modeled output displayed in the National Results table.

Page 13 References

SUGGESTED CITATION:

Barrett JL, Bolton AA, Gortmaker SL, Craddock AL. CHOICES National Action Kit: New Opportunities for Healthy Afterschool Programs Strategy Report. CHOICES Project Team at the Harvard T.H. Chan School of Public Health, Boston, MA; December 2023.

ACKNOWLEDGMENTS:

We thank the following members of the CHOICES Project team for their contributions: Molly Garrone, Dar Alon, Stella Zhu, Shilpi Agarwal, Ana Paula Bonner Septien, Stephanie McCulloch, Jenny Reiner, Matt Lee, Zach Ward.

This work is supported by the National Institutes of Health (R01HL146625), The JPB Foundation, the Centers for Disease Control and Prevention (U48DP006376). The findings and conclusions are those of the author(s) and do not necessarily represent the official position of the Centers for Disease Control and Prevention or other funders. The information provided here is intended to be used for educational purposes. Links to other resources and websites are intended to provide additional information aligned with this educational purpose.

Contact the CHOICES Project: choicesproject@hsph.harvard.edu

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.

Providing school-age children in grades K-5 attending Title I public schools with free state-administered afterschool programs that include 80 minutes of physical activity, a healthy snack, academic enrichment, and homework assistance.

WHAT POPULATION BENEFITS?

Children in grades K-5 who experience low income and are not currently participating in afterschool programs but would if programs were available.

WHAT ARE THE ESTIMATED BENEFITS?

Relative to not implementing the strategy

Increase moderate-to-vigorous physical activity and, in turn, promote healthy child weight.



✓ Increase in moderate-to-vigorous physical activity



✓ Prevent cases of obesity



✓ Projected to be cost-saving*



✓ Likely to improve health equity by race and ethnicity

***The costs of implementing this strategy could be offset by savings from...**

↓ Decrease in time cost of parent, relative, and non-relative caregivers to provide care for children newly attending afterschool programming

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

WHAT ACTIVITIES AND RESOURCES ARE NEEDED?

Activities	Resources	Who Leads?
Administer funding and coordinate afterschool programming	<ul style="list-style-type: none"> • Time for federal and state directors to lead administration and funding of afterschool programs in each state • Time for federal, state, and district coordinators to coordinate afterschool programming and funding 	Federal and state directors
Coordinate transportation for children attending afterschool programs	<ul style="list-style-type: none"> • Time for district transportation coordinator 	School district transportation coordinator
Train afterschool program site directors and staff and school district food service directors to operate the afterschool programs	<ul style="list-style-type: none"> • Time for state physical activity training facilitator to lead annual trainings • Time for afterschool program site directors and staff (teachers and paraprofessionals) to attend annual trainings • Time for school district food service directors to attend annual trainings on operating a healthy afterschool snack program 	State physical activity training facilitator
Purchase physical activity curricula, equipment, and materials for operating afterschool programs	<ul style="list-style-type: none"> • Cost of physical activity curricula and equipment • Cost of afterschool program handbook provided to families 	School district coordinator
Provide afterschool snacks that meet USDA afterschool snack program guidelines from the National School Lunch Program or the Child and Adult Care Food Program	<ul style="list-style-type: none"> • Cost of snacks 	School district food service director
Provide afterschool programming	<ul style="list-style-type: none"> • Time of afterschool program site director • Time of afterschool program staff (teachers and paraprofessionals) • Time for school custodial staff to clean afterschool program space 	Afterschool program site director
Provide transportation home from afterschool programs	<ul style="list-style-type: none"> • Cost of bus transportation 	School district transportation coordinator

- See our resource library for relevant peer-reviewed publications, research reports, & briefs at choicesproject.org/resource-library
- Learn more about the evidence for the strategy New Opportunities for Healthy Afterschool Programs in the CHOICES peer-reviewed publication: [Cradock et al. 2017. *Prev Med*](#)

Adapted from CHOICES Strategy Profile: New Opportunities for Healthy Afterschool Programs. CHOICES Project Team at the Harvard T.H. Chan School of Public Health, Boston, MA; October 2023.

NATIONAL RESULTS

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

DESCRIPTION	Providing school-age children (ages 5-12) with free afterschool programs that include 80 minutes of physical activity, a healthy snack, academic enrichment, and homework assistance
OUTCOME	Mean (95% UI)*
BEHAVIOR CHANGE PER PERSON <i>Change in health behavior per person in the first year</i>	7,040 more minutes of physical activity (6,090; 8,060) <i>Moderate-to-vigorous physical activity minutes, per year</i>
COST PER PERSON <i>Average annualized cost per person to implement the strategy over the model period</i>	-\$1,620 (cost-saving)† (-\$1,790; -\$1,450) See Cost Results
POPULATION REACH <i>Reach over the model period</i>	7,640,000 (7,460,000; 7,800,000)
OBESITY PREVENTED <i>Cases of obesity prevented in the final year</i>	65,000 (32,000; 102,000)
CHILD OBESITY PREVENTED <i>Cases of child obesity prevented in the final year</i>	64,600 (31,900; 101,000)
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>	19,500 (10,100; 29,100)
OBESITY YEARS PREVENTED <i>Years with obesity prevented (totals over the model period)</i>	445,000 (225,000; 683,000)
HEALTH CARE COSTS SAVED PER \$1 INVESTED <i>Total health care costs saved per total intervention costs over the model period</i>	Cost-saving† >99% likelihood
COST PER QALY GAINED <i>Net cost per quality-adjusted life year (QALY) gained (totals over the model period)</i>	Cost-saving† >99% likelihood

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.

†This strategy is projected to be cost saving because it reduces the time cost of parent, relative, and non-relative caregivers who would have otherwise been providing care for children in the absence of afterschool programming. Health care costs are also saved due to reductions in excess weight among the population reached.

- ✓ 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 providing new opportunities for healthy afterschool programs if implemented nationally 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 Cost excluding Offsets‡
Administer funding and coordinate afterschool programming	<ul style="list-style-type: none"> Time for federal and state directors to lead administration and funding of afterschool programs in each state Time for federal, state, and district coordinators to coordinate afterschool programming and funding 	\$114	Federal government	24%
Coordinate transportation for children attending afterschool programs	<ul style="list-style-type: none"> Time for district transportation coordinator 	\$1.99	School district	<1%
Train afterschool program site directors and staff and school district food service directors to operate the afterschool programs	<ul style="list-style-type: none"> Time for state physical activity training facilitator to lead annual trainings Time for afterschool program site directors and staff (teachers and paraprofessionals) to attend annual trainings Time for school district food service directors to attend annual trainings on operating a healthy afterschool snack program 	\$11.20	Federal government, School district	2%
Purchase physical activity curricula, equipment, and materials for operating afterschool programs	<ul style="list-style-type: none"> Cost of physical activity curricula and equipment Cost of afterschool program handbook provided to families 	\$4.94	Federal government	1%
Provide afterschool snacks that meet USDA afterschool snack program guidelines from the National School Lunch Program or the Child and Adult Care Food Program	<ul style="list-style-type: none"> Cost of snacks 	\$48.90	Federal government	10%
Provide afterschool programming	<ul style="list-style-type: none"> Time of afterschool program site director Time of afterschool program staff (teachers and paraprofessionals) Time for school custodial staff to clean afterschool program space 	\$199	Federal government, School district	42%
Provide transportation home from afterschool programs	<ul style="list-style-type: none"> Cost of bus transportation 	\$97.00	School district	20%
COST excluding offsets‡	--	\$477	--	100%
Cost offsets (cost savings)‡	<ul style="list-style-type: none"> Time of parent, relative, and non-relative caregivers who would have otherwise been providing care for children in the absence of afterschool programming 	-\$2,090	Family/ Individual	3%
TOTAL COST including offsets‡ (Cost excluding offsets + cost offsets)	--	-\$1,620	--	100%

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

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

‡Cost offsets, or cost savings, resulting from implementation of the strategy are included in the total cost. Implementation of this strategy reduces the time cost of parent, relative, and non-relative caregivers who would have otherwise been providing care for children in the absence of afterschool programming.

Continued on the next page

Average Annual Strategy Implementation Cost by Payer and Cost Type			
Payer	Cost per Person†		
	All Costs (% of Cost excluding Offsets‡)	Budgetary Costs (% of All Costs by Payer)	Opportunity Costs (% of All Costs by Payer)
Federal government	\$316 (66%)	\$53.80 (17%)	\$263 (83%)
State government	--	--	--
Local government	\$161 (34%)	\$97.00 (60%)	\$63.60 (40%)
School district	--	--	--
School	--	--	--
Family/Individual	--	--	--
Industry	--	--	--
Nonprofit	--	--	--
Health care	--	--	--
COST excluding offsets‡	\$477 (100%)	\$151 (32%)	\$326 (68%)
Family/Individual Cost offsets (cost savings)‡	-\$2,090	\$0.00 (0%)	-\$2,090 (100%)
TOTAL COST including offsets‡ (Cost excluding offsets + cost offsets)	-\$1,620	\$151	-\$1,770

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

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

‡Cost offsets, or cost savings, resulting from implementation of the strategy are included in the total cost. Implementation of this strategy reduces the time cost of parent, relative, and non-relative caregivers who would have otherwise been providing care for children in the absence of afterschool programming.

→ 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.

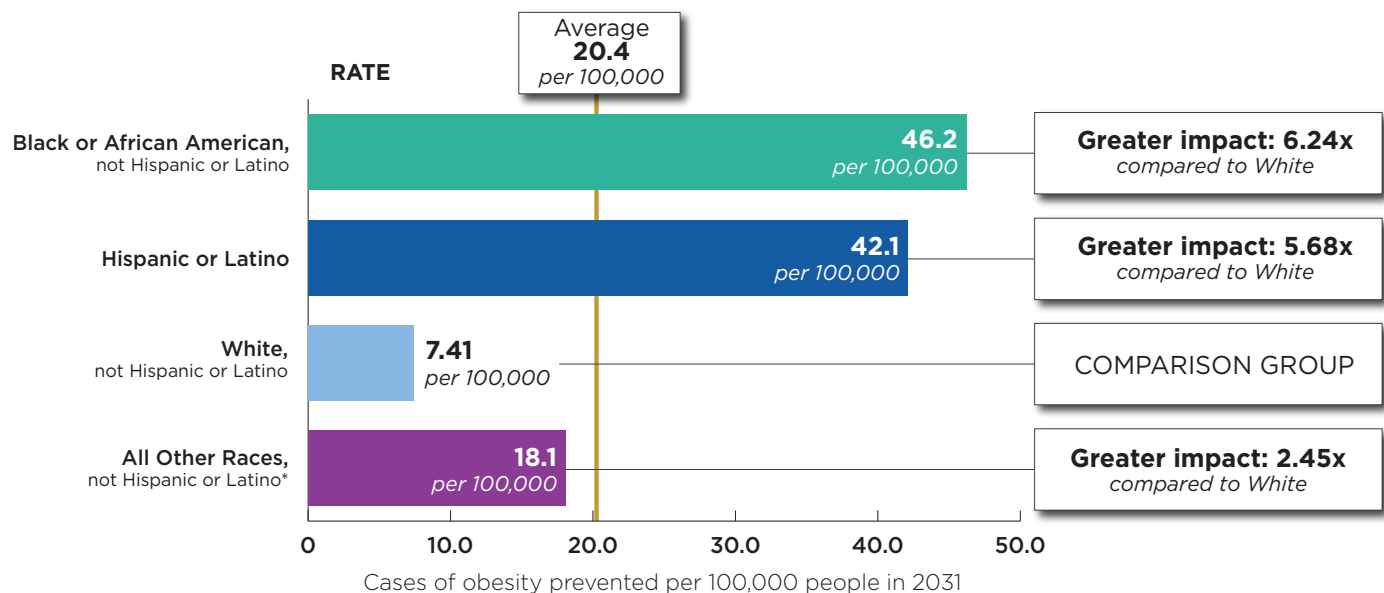
KEY TAKEAWAYS

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

- ✓ **Prevent 65,000 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



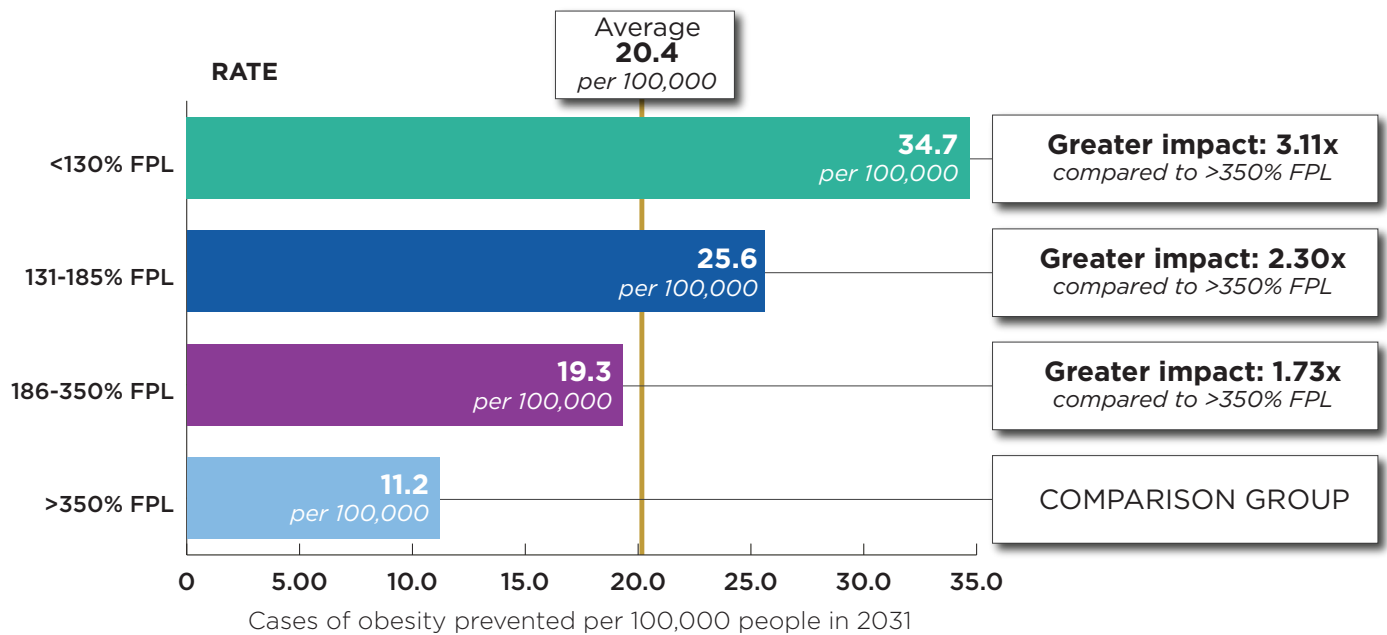
*All Other Races includes people who identify as American Indian/Alaska Native, Asian, Native Hawaiian or Pacific Islander, Multi-racial, or another race or ethnicity not represented in the categories shown. While each of these groups represent distinct populations with differences in health opportunities, 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 6.24 and 5.68 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](#).*

Continued on the next page

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 2.30-3.11 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 opportunities to grow up healthy. Regular physical activity, healthy eating, and adequate hydration can help children maintain a healthy weight. Afterschool programs can provide important opportunities for students to learn healthy eating habits and promote physical activity and wellness. However, not all families have access to afterschool programming.⁵ More than half of elementary school age children who do not participate in an afterschool program would if one were available to them, and unmet demand is highest among Black and Hispanic or Latino children.⁵ Parents, and those with low incomes in particular, report that cost and lack of available programs are top reasons for not enrolling their child in an afterschool program.⁵ Providing free state-administered afterschool programs that include 80 minutes of physical activity, a healthy snack, academic enrichment, and homework assistance can support healthy eating habits and promote physical activity among elementary school age children. Providing these new afterschool opportunities for children attending Title I public schools is expected to improve health and promote health equity for Black and Hispanic or Latino children and children from households with lower incomes, who are more likely to attend Title I schools and have unmet demand for afterschool programming than non-Hispanic White students and students in households with higher incomes.⁶⁻⁸

Continued on the next page

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

	OBSESITY PREVENTED	OBSESITY 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><i>Compared with White, not Hispanic or Latino</i></u>	<u><i>Compared with Population Average</i></u>
Overall	65,000 (32,000; 102,000)	20.4 (10.0; 3.19)	--	1.00 (Reference) N/A
Black or African American, not Hispanic or Latino	18,800 (8,770; 30,600)	46.2 (21.5; 74.9)	6.24 (4.15; 8.74) >99% likelihood of greater impact	2.27 (1.78; 2.73) >99% likelihood of greater impact
Hispanic or Latino	27,400 (13,500; 44,400)	42.1 (20.8; 68.1)	5.68 (4.13; 8.18) >99% likelihood of greater impact	2.07 (1.72; 2.42) >99% likelihood of greater impact
White, not Hispanic or Latino	13,700 (6,410; 22,400)	7.41 (3.46; 12.1)	1.00 (Reference) N/A	0.36 (0.28; 0.45) >99% likelihood of lesser impact
All Other Races, not Hispanic or Latino ^c	5,110 (2,240; 8,980)	18.1 (8.01; 31.7)	2.45 (1.67; 3.41) >99% likelihood of greater impact	0.89 (0.60; 1.22) 76% likelihood of lesser impact
Household Income as a percentage of the federal poverty level (FPL)			<u><i>Compared with >350% FPL</i></u>	<u><i>Compared with Population Average</i></u>
Overall	65,000 (32,000; 102,000)	20.4 (10.0; 3.19)	--	1.00 (Reference) N/A
<130% FPL	26,400 (12,800; 42,100)	34.7 (16.8; 55.5)	3.11 (2.44; 3.98) >99% likelihood of greater impact	1.70 (1.51; 1.91) >99% likelihood of greater impact
131-185% FPL	8,500 (4,070; 14,200)	25.6 (12.3; 42.7)	2.30 (1.65; 3.13) >99% likelihood of greater impact	1.26 (0.99; 1.56) 96% likelihood of greater impact
186-350% FPL	15,900 (7,640; 25,500)	19.3 (9.31; 31.0)	1.73 (1.32; 2.25) >99% likelihood of greater impact	0.95 (0.79; 1.12) 76% likelihood of lesser impact
>350% FPL	14,200 (6,770; 22,800)	11.2 (5.30; 17.8)	1.00 (Reference) N/A	0.55 (0.46; 0.65) >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 New Afterschool programs involves a national policy requiring states to create new afterschool programs in school settings for low income elementary school-age children (ages 5-12) not now participating in programs, but who would if programs were available.⁹ The federal policy would require programs to follow the FitKid model, including 2-hour sessions supervised by classroom teachers and paraprofessionals.¹⁰ The sessions would involve a 40-min period with snack and academic enrichment activities and an 80-min period of physical activity (PA), with 40 min devoted to vigorous PA.¹⁰ Children would receive snacks that meet nutrition guidelines set by the National School Lunch Program Afterschool Snack Program or Child and Adult Care Food Program.

REACH

The intervention reaches low-income elementary school-age children (ages 5-12) not now participating in afterschool programs, but who would if programs were available.⁹ The number of children in schools with Title I schoolwide status was estimated by using data from Department of Education data provided by The Annie E. Casey Foundation,⁶ assuming 43% of students were in elementary schools.⁷ The Afterschool Alliance reports an estimate of the numbers of children in each state who are not currently participating in afterschool programs but would if programming were available.⁸

The New Opportunities for Healthy Afterschool Programs strategy would reach 7.64 million children over 10 years.

EFFECT

Children reached by the New Opportunities for Healthy Afterschool Programs strategy would experience an average BMI change that is 0.33 units (kg/m^2) lower than BMI changes among children not participating.¹⁰⁻¹²

To estimate the impact of the strategy on behavior change, we modeled the impact on moderate-to-vigorous physical activity (MVPA) separately (that is, not via the pathway to BMI change). One study estimated that during programming, children would engage in 0.32 hours more MVPA per day.¹³

Children reached by the New Opportunities for Healthy Afterschool Programs strategy would engage in 7,040 more minutes of MVPA per year. In 2031, 65,000 cases of obesity would be prevented.

COST

Creation of new afterschool programs following the FitKid model nationwide requires training teachers and paraprofessionals to coordinate and staff the afterschool programs, which we assume is overseen at the federal, state, and district levels.⁹ The purchase of physical activity curricula and equipment and the costs of afterschool snacks via the National School Lunch Program or Child and Adult Care Food Program were included.⁹⁻¹⁴ The cost of custodial support to enable use of program space and the cost of transportation home from the afterschool program were also included.⁹

The cost offset of caregiver time (i.e., parents, relatives, and non-relatives) to supervise children who previously would not have been receiving afterschool programming was estimated and included in the model.⁹ Providing access to reliable care in afterschool programming could free up caregivers' time for other activities, including participating in paid employment and earning additional family income.

Continued on the next page

NEW OPPORTUNITIES FOR HEALTHY AFTERSCHOOL PROGRAMS STRATEGY DETAILS & MODELING METHODS *(continued)*

Total costs of the strategy were estimated by adding the costs of coordinating and operating the new afterschool programs and the cost offsets from reduced time parent, relative, and non-relative caregivers would spend caring for children in the absence of afterschool programs. As a result, the strategy is projected to be cost-saving due to cost offsets arising from greater efficiencies in care for children. The New Opportunities for Healthy Afterschool Programs strategy would result in a net cost of -\$1,620 per child per year (a cost savings), compared to not implementing the strategy.

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,¹⁵ greater healthcare expenditures,¹⁶ and increased mortality risk.¹⁷ 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).¹⁸ 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.^{19,20} 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.²¹ 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.

For more information about this strategy, see:

Cradock AL, Barrett JL, Kenney EL, Giles CM, Ward ZJ, Long MW, Resch SC, Pipito AA, Wei ER, Gortmaker SL. Using cost-effectiveness analysis to prioritize policy and programmatic approaches to physical activity promotion and obesity prevention in childhood. *Prev Med.* 2017 Feb;95 Suppl: S17-S27. doi: 10.1016/j.ypmed.2016.10.017. Supplemental Appendix with strategy details available at: <https://ars.els-cdn.com/content/image/1-s2.0-S0091743516303395-mmc1.docxS>

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 household 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. The Afterschool Alliance. America After 3PM: Demand Grows, Opportunity Shrinks. 2020.
6. The Annie E Casey Foundation. Children in Title 1 Schools by Race and Ethnicity in the United States 2018-2019. Last updated July 2021. Accessed 5/23/2023. <https://datacenter.aecf.org/data/tables/8418-children-in-title-1-schools-by-race-and-ethnicity#detailed/2/2-53/false/1696/167,168,133,3,185,107/17042>
7. National Center for Education Statistics. Table 203.10. Enrollment in public elementary and secondary schools, by level and grade: Selected years, fall 1980 through fall 2030. 2021. Digest of Education Statistics, NCES. Accessed June 15, 2023. https://nces.ed.gov/programs/digest/d21/tables/dt21_203.10.asp
8. The Afterschool Alliance. America After 3pm: The most in-depth study of how America's children spend their afternoons. 2009.
9. Cradock AL, Barrett JL, Kenney EL, Giles CM, Ward ZJ, Long MW, Resch SC, Pipito AA, Wei ER, Gortmaker SL. Using cost-effectiveness analysis to prioritize policy and programmatic approaches to physical activity promotion and obesity prevention in childhood supplemental appendix. *Prev Med*. 2017 Feb;95 Suppl: S17-S27. doi: 10.1016/j.ypmed.2016.10.017. Available at: <https://ars.els-cdn.com/content/image/1-s2.0-S0091743516303395-mmc1.docx>
10. Barbeau P, Johnson MH, Howe CA, et al. Ten months of exercise improves general and visceral adiposity, bone, and fitness in black girls. *Obesity (Silver Spring)*. 2007; 15:2077-2085. Available at: <https://pubmed.ncbi.nlm.nih.gov/17712126>
11. Yin Z, Gutin B, Johnson MH, et al. An environmental approach to obesity prevention in children: Medical College of Georgia FitKid Project year 1 results. *Obes Res*. 2005; 13:2153-2161. Available at: <https://pubmed.ncbi.nlm.nih.gov/16421350>
12. Hillman, C.H., Pontifex, M.B., Castelli, D.M., et al., 2014. Effects of the FITKids randomized controlled trial on executive control and brain function. *Pediatrics* 134 (4), E1063-E1071 (Oct.). Available at: <https://pubmed.ncbi.nlm.nih.gov/25266425>
13. Howe, C.A., Harris, R.A., Gutin, B., 2010. A 10-month physical activity intervention improves body composition in young black boys. *J Obes*. 2011. Available at: <https://pubmed.ncbi.nlm.nih.gov/20981151>
14. Wang LY, Gutin B, Barbeau P, Moore JB, Hanes J, Jr, Johnson MH, et al. Cost-effectiveness of a school-based obesity prevention program. *J Sch Health*. 2008; 78(12):619-24. Available at: <https://pubmed.ncbi.nlm.nih.gov/19000237>
15. Centers for Disease Control and Prevention. Consequences of Obesity. Accessed September 13, 2023 at: <https://www.cdc.gov/obesity/basics/consequences.html>
16. 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.
17. 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
18. Centers for Disease Control and Prevention. Obesity Basics. Accessed September 13, 2023 at: <https://www.cdc.gov/obesity/basics/index.html>
19. 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.
20. 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.
21. 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