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Modeling Economic Benefits of a Nutrition Education Program

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Executive Summary

One of the provisions of the H.R.1 One Big Beautiful Bill Act of 2025 was [the elimination of federal funding for the Supplemental Nutrition Assistance Program–Education \(SNAP-Ed\)](#). SNAP-Ed programs aimed to improve healthy eating, physical activity, and food resource management skills. They have been shown to impact individuals' habits and short-term behaviors, and to influence community policies, systems, and environments to support health. This paper highlights the potential effects of the funding cancellation by analyzing changes in health and economic outcomes based on short-term behavior changes from SNAP-Ed programming designed to address food insecurity and obesity.

This paper describes an economic model that applied previous evidence to estimate future health spending, annual earnings, and mortality trajectories for the Illinois SNAP-Ed population. Direct impacts of the SNAP-Ed program (such as improvements in food security, increased fruit and vegetable consumption, and increased physical activity) are linked through the literature to intermediate outcomes (such as higher graduation rates and reduced obesity risk), which in turn are linked to impacts on mortality, health care costs, and earnings.

Findings from this study show that food resource management programming averts 6.0 food insecurity cases per 1,000 and produces benefits of \$5,335 to \$86,944. Healthy eating and physical activity programming averts 7.2 obesity cases per 1,000 and produces benefits between \$2,178 to \$29,510 per case, depending on age and model assumptions. When applied to a single-year cohort of 794,912 individuals, discounted societal benefits range between \$76.0 and \$135.4 million and include health care cost savings (\$35.7-\$65.8 million) and increased lifetime earnings (\$40.3-\$69.5 million).

This work demonstrates the strong likelihood that, had SNAP-Ed not been cancelled, the program would have generated future economic benefits substantial enough to yield a positive societal return on investment.

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Introduction

One of the provisions of the H.R.1 One Big Beautiful Bill Act of 2025 was the elimination of federal funding for the Supplemental Nutrition Assistance Program–Education (SNAP-Ed).¹ SNAP-Ed interventions aimed to teach healthy eating, physical activity, and food resource management skills and have been shown to impact individuals' habits and short-term behaviors, and community policies, systems, and environments to support health-related choices. This paper evaluates the potential effects of the funding cancellation by assessing changes in health and economic outcomes based on short-term behavior changes influenced by SNAP-Ed programming targeting food insecurity and obesity.

SNAP-Ed was a federally funded grant program that aimed to improve the likelihood that persons eligible for SNAP would make healthy food choices on a limited budget.² SNAP-Ed addressed food and nutrition insecurity and reduced diet-related chronic diseases by implementing strategies that supported healthy eating and active living among SNAP participants and other individuals who qualified for SNAP benefits or other means-tested programs. Illinois SNAP-Ed delivered community-wide nutrition, physical activity, and food resource management programming through direct nutrition education, comprehensive multi-level interventions, and community and public health approaches. Programming was implemented through a community-based approach grounded in the social ecological model.^{2,3}

Educational content and strategies delivered by SNAP-Ed in all states were evidence-based and underwent ongoing evaluation of program participation and participant outcomes as a part of the administration of funding.⁴ Prior evaluations of SNAP-Ed have found improved dietary quality,⁵⁻⁷ improved cardiovascular fitness,⁸ and modeled likely reductions in body mass index (BMI).⁹ However, results of studies of educational activities consistent with SNAP-Ed programming are often limited to findings on short-term outcomes such as healthy habits, behaviors, and confidence in making healthy choices. Past attempts to measure longer-term outcomes, such as health status or spending, have produced inconclusive results. There are numerous obstacles to following participants longitudinally, especially in communities with lower incomes.¹⁰ Among them are the need for a long follow-up period to detect SNAP-Ed impacts and attrition of study participants over time.¹¹ As a result, it is difficult to estimate the economic impact and societal benefits of SNAP-Ed programming in Illinois or other states.

This difficulty in estimating programmatic benefits for SNAP-Ed exists despite strong evidence that the individual adverse health risks targeted by SNAP-Ed interventions have significant economic impacts. In youth, food insecurity has been linked to lower test scores and graduation rates,¹²⁻¹⁴ while in adults it has been correlated with higher health care spending.¹⁵ Previous studies have linked obesity with mortality risk,¹⁶ long-term health care costs,¹⁷ absenteeism and workforce participation,¹⁸ presenteeism,¹⁹ overall future earnings,²⁰ and many co-occurring health conditions.²¹ These linkages can be directly tied to future economic outcomes and calculations of societal impacts. Therefore, SNAP-Ed programmatic data and existing evidence on the impacts of educational classes and outreach can be used in economic modeling to reasonably estimate the total future societal benefits of reductions in food insecurity and obesity.



Despite the elimination of federal funding for SNAP-Ed, evaluating and sharing its estimated return on investment is critical for evidence-based decision making. Demonstrating the economic consequences of interventions that address food insecurity and obesity helps clarify the broader value of preventive public health programs and provides a benchmark for assessing future investments in similar health and nutrition initiatives.

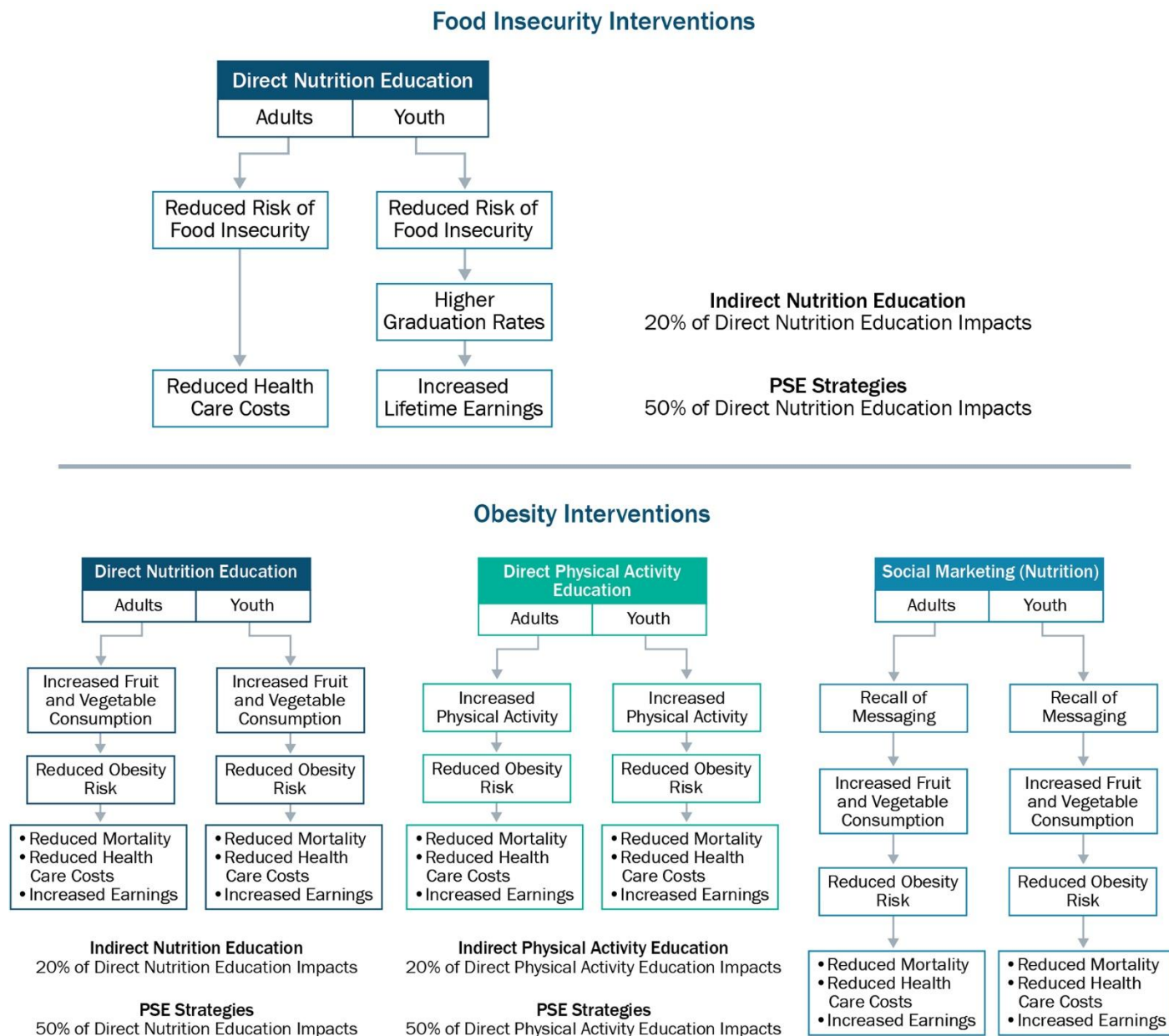
METHODS

To model these impacts, participation in different types of SNAP-Ed interventions was linked to short-term behavior changes (such as fruit and vegetable consumption or physical activity) that are expected to have an effect on the prevalence of one of two long-term outcomes (food insecurity or obesity), and then monetized as the benefits of averted cases of adverse outcomes among participants using a previously constructed economic valuation tool.²² This tool uses inputs of differences between two future lifepath scenarios (representing individuals with and without a SNAP-Ed intervention) of health, longevity, earnings, and health spending outcomes for a set population to calculate changes in total economic and societal outcomes for the two pathways of interest in this work—food insecurity and obesity. This study was reviewed for Institutional Review Board approval and deemed exempt by the University of Illinois Institutional Review Board.

Different types of SNAP-Ed programming expected to influence food insecurity and obesity are categorized along two dimensions. The first dimension is the type of education offered: (1) education delivered directly to participants (i.e., direct education), (2) indirect educational outreach, (3) policy, system, and environmental (PSE) change strategies that seek to address systematic factors, and (4) social marketing campaigns. The second dimension is the focus area of the educational programming based on the type of healthy behaviors or skills influenced: (1) nutrition and healthy diet, (2) physical activity, and (3) food resource management skills. **Figure 1** illustrates the interventions that were included in the analysis, including the pathways by which each intervention leads to economic and societal outcomes.



Figure 1. Pathways to Benefits for Each Type and Modality of SNAP-Ed Intervention



The figure illustrates the various pathways through which the SNAP-Ed program achieves benefits via food insecurity and obesity interventions. These include direct and indirect education; policy, systems, and environmental (PSE) strategies; and social marketing.



Illinois SNAP-Ed data were used to estimate the number of individuals receiving each type and modality of programming and the age group demographics for each programming type.² A survey of SNAP-eligible Illinois residents was conducted to estimate the number of individuals who actively recalled Illinois SNAP-Ed social marketing messages promoting healthy living behaviors.²³ To ensure that benefits for individual participants attending multiple SNAP-Ed classes of the same type were not double-counted, Illinois SNAP-Ed educators were surveyed to estimate the share of “repeat” participants, because participants in Illinois are not tracked at the individual level across direct education series. Estimated duplicates were deducted from the total counts of the SNAP-Ed population.

Whenever reasonable, the most recently available year of participant data from Illinois SNAP-Ed (fiscal year 2020) was used to estimate the size of the population. In cases where programming or data collection was significantly disrupted by the COVID-19 pandemic, alternate data from prior year(s) that best represented a typical recent year of Illinois SNAP-Ed activities (fiscal year 2019) were used.

A literature review identified the available estimates of how similar educational programming for each permutation of the two dimensions above has been shown to impact short-term healthy behaviors (e.g., daily fruit and vegetable consumption and weekly physical activity). While nutrition, physical activity, and food resource management education are likely to result in a variety of short-term and long-term benefits for participants, it was important to identify only a single pathway for each educational focus area of the modeling to avoid risks of double-counting benefits. Therefore, the best short-term behavior outcome was identified for each pathway based on the quality of the evidence to support those behavior improvements and the quality of the evidence to link the short-term behavior change to the intermediate health outcomes monetized in the final economic model.

An additional literature review was conducted to estimate the impacts of the two intermediate outcomes selected (food insecurity and obesity) on future mortality risks, annual health spending estimates, and annual individual earnings over time conditional on each health status. These effect sizes were applied to baseline mortality, health spending, and individual earnings “lifepath” trajectories for the Illinois population that were calculated from available national and state datasets (**Appendix Table A1**). All future benefits were discounted to current-year dollars using a constant discount rate.

Lastly, the economic results of the benefits per individual from each prevented case of food insecurity and obesity for each age group was used to compute total SNAP-Ed future economic benefits. This was achieved by multiplying the estimated discounted future benefit per individual by the number of individuals in each SNAP-Ed age group and education category permutation and showing impacts by type and stakeholder.

Two main sensitivity analyses of the modeling inputs were conducted based on two uncertain inputs: 1) the duration that healthy behavior changes and modeled improved health outcomes from SNAP-Ed programming persist before individuals revert to the population baseline (five and ten years); and 2) the relative effectiveness of indirect education (10 percent and 25 percent) and PSE strategies (40 percent and 100 percent) compared to direct education, for which positive impacts are likely, but specific studies supporting their effect size could not be identified in literature reviews. Other limitations of the data and model are discussed in the **Appendix**.



RESULTS

Modeling Results of Averted Food Insecurity

The benefits of an averted case of food insecurity range from \$5,335 to \$86,944 (depending on a participant's age group), a greater range than the averted obesity cases because of the larger economic impacts associated with the graduation and future earnings pathway. For youth, benefits in either the five- or ten-year scenario range from \$30,297 for the youngest age groups to \$86,944 per case for those near adulthood, due to the fact that those closer to adulthood will more quickly enter the workforce and see benefits of increased graduation rates. Conversely, the health benefits of averted cases of food insecurity for adults range from \$5,335 to \$9,316 under the five-year assumption, and \$10,098 to \$15,830 under the 10-year assumption. The majority of benefits for working-aged adults accrue to households due to lower private health care costs, while most benefits for older adults accrue to the federal government due to Medicare savings.

Modeling Results of Averted Obesity

The discounted future economic benefits of averting a case of obesity for the Illinois SNAP-Ed population range from \$2,178 to \$16,116 (depending on a participant's age group) under the assumption that these health changes persist for five years and alternatively \$4,226 to \$29,510 if health changes persist for ten years. For younger, working-aged adults (ages 18 to 59), 36 percent of total benefits accrue from lower health care costs under the five-year assumption and 38 percent under the ten-year assumption, while the remaining 64 percent to 62 percent, respectively, accrue from increased earnings due to lower rates of premature mortality and greater earnings for those alive. Conversely, for older adults (aged 60 and older) the majority of these future benefits (between 89 percent and 90 percent) accrue from health care savings, due to lower average earnings per individual in this age range and much greater average health care costs for older adults. For youth, the estimated benefits of averting a case of obesity are the lowest among the different age groups, ranging between \$2,178 and \$4,558 depending on permanence assumptions, and the benefits stem completely from lower health care costs.

Across the different payors, households and the private sector see the greatest benefit per averted case (between \$1,426 and \$10,923 in the five-year assumption), with those benefits accruing from greater retained future earnings and lower private health care costs. The share of benefits for households and the private sector is greatest in middle age because the majority of increased earnings and productivity are retained by households. Alternatively, the federal government benefits from an averted case of obesity amount to between \$729 to \$7,936 and are the greatest share among older adults, due to increasing Medicare costs as adults age. The smallest share of total benefits from averted obesity accrue to state and local governments (\$22 to \$1,291 per case) and are driven mostly from state taxes on income and decreased Medicaid costs.

Number of Cases Averted

Based on 2020 national food insecurity estimates, 28.6 percent of SNAP-Ed participants would experience food insecurity in the absence of SNAP-Ed programming. With SNAP-Ed, these rates would be expected to decline to 28.0 percent, resulting in 6.0 fewer cases of food insecurity per 1,000 participants annually as a result of SNAP-Ed food resource management direct education, indirect education, and PSE strategies. Among the 97,075 SNAP-Ed participants receiving this programming, this translates to 586 averted cases of food insecurity, benefiting 490 adults through lower average health care costs and 96 school-aged youth through improved graduation rates (**Table 1**).



The estimated background rate of obesity for Illinois SNAP-Ed participants in the absence of SNAP-Ed programming is 27.9 percent. This incorporates the mix of ages participating in the educational activities and the background obesity rate in Illinois which ranged from 15.4 percent for youth to 32.5 percent for adults over the age of 60 in 2019. With the impact of direct education, indirect education, PSE strategies and social marketing campaigns, SNAP-Ed participants would instead have an estimated average obesity rate of 27.2 percent, conferring a reduction of 7.2 cases of obesity per 1,000 participants.

This would result in 5,056 fewer cases of obesity in a year: 4,456 in averted cases resulting from nutrition programming and 600 through physical activity programming, among the 697,837 individuals receiving either type of programming. (Table 1). The greater number of cases prevented from nutrition programming is primarily due to a greater frequency of this type of educational offering. Of these averted obesity cases, 524 would be among youth participating in SNAP-Ed programming, while 4,532 would be adults.

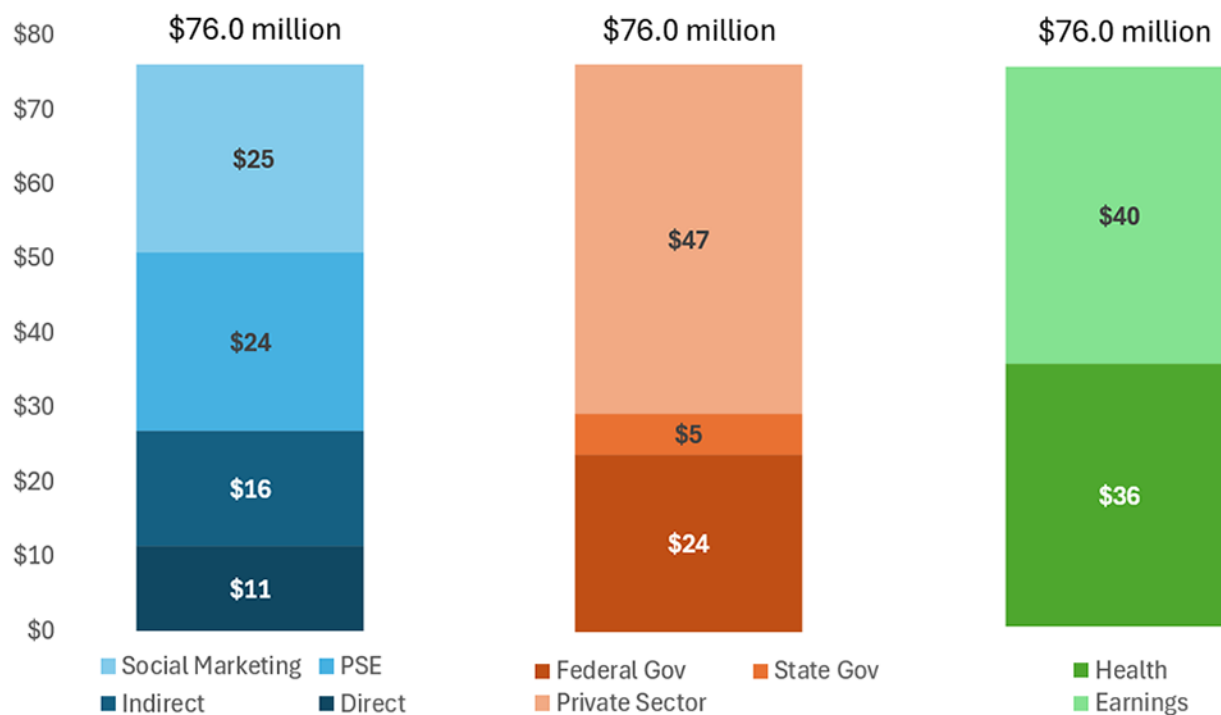
Table 1: Model Results of Counts and Rates of Food Insecurity and Obesity Cases Prevented by Illinois SNAP-Ed

	Food Insecurity		Obesity	
	Adults	Children	Adults	Children
Total State SNAP-Ed Population	87,516	9,559	502,123	201,118
Status Quo Counts (Rate per 1,000)	25,030 (286.0)	2,734 (286.0)	159,957 (318.6)	34,922 (178.4)
Prevented Cases (Rate per 1,000)	490 (5.6)	96 (10.1)	4,532 (9.0)	524 (2.7)

Total Future Economic Benefits and Sensitivity Analyses

For the total annual SNAP-Ed population participating in the four types of programming in a typical year (794,912 participants in the most recent years of relevant data), the 5,056 prevented cases of obesity and 586 prevented cases of food insecurity would generate a total societal value of between \$76.0 million and \$135.4 million. The lower estimate assumes a five-year persistence of the obesity and food security benefits, while the upper bound assumes a longer, ten-year window of improved outcomes from those participating in the programming. Across all priority areas for the five-year assumption, the largest economic benefits were generated by the social marketing campaign (\$25.3 million), followed by the PSE strategies (\$23.9 million), indirect education (\$15.5 million), and direct education (\$11.3 million) (Figure 2).



Figure 2. Decomposition of 5-year Benefit Windows

This figure represents the millions of dollars in benefits across a five-year window for four categories of benefits: direct, indirect, PSE, and social marketing SNAP-Education programming; federal government, state government, and private sector benefits; and health and earnings benefits.

The relative sizes of the total economic benefits for the four program types are driven by their relative average impacts per person, the number of individuals reached, and the demographics of those participating by each type. For example, direct education programming may have the smallest overall total impact in this analysis, but that is primarily because its population reached is the smallest among the four, and it reaches a greater share of participants under 18 years of age where obesity rates are lower. Across the different domains of the program, the largest component of the total economic benefit comes from the diet quality/healthy eating priority area (\$66.6 million), due to the fact the greatest number of individuals received this type of programming. The next largest priority area was food resource management benefits (\$5.6 million), followed by physical activity benefits (\$3.9 million) (data not shown).

When apportioned between the benefits that accrue to the three major societal stakeholders (households and the private sector, the federal government, and state/local governments), the largest benefiting stakeholders from Illinois SNAP-Education were households and the private sector (\$46.7 million), followed by savings to the federal government (\$23.9 million) and savings to state and local governments (\$5.4 million) (**Figure 2**). When the benefits are split between health and earnings sources, the model results show that, in the five-year benefit window, \$40.3 million of the total \$76.0 million benefits result from increased future lifetime earnings, while \$35.7 million result from reductions in future health care spending (**Figure 2**).

Under the “lower-bound” sensitivity analysis that assumes total effects on food insecurity and obesity of indirect education are 10 percent as effective and PSE strategies are 25 percent as



effective (rather than the base cases of 20 percent and 50 percent respectively), indirect education benefits would fall from \$15.5 million to \$7.8 million and PSE benefits would fall from \$23.9 million to \$11.9 million under the five-year benefits assumption (**Table 2**). This case would result in total discounted benefits from SNAP-Ed programming of \$56.3 million, compared to the baseline assumptions of \$76.0 million.

Table 2: Total Modeled Benefits of SNAP-Ed Programming and Sensitivity Analyses

Sensitivity Analysis Relative Effectiveness	Indirect Education Benefit (Five-year)	PSE Change Strategies Benefit (Five-Year)	Total SNAP-Ed Benefits (Five-Year Assumption)	Indirect Education Benefit (Ten-Year)	PSE Change Strategies Benefit (Ten-Year)	Total SNAP-Ed Benefits (Ten-Year Assumption)
Base Case	\$15.5 Million	\$23.9 Million	\$76.0 Million	\$27.6 Million	\$42.3 Million	\$135.4 Million
Lower Bound	\$7.8 Million	\$11.9 Million	\$56.3 Million	\$13.8 Million	\$21.1 Million	\$100.5 Million
Upper Bound	\$31.1 Million	\$47.8 Million	\$115.5 Million	\$552 Million	\$84.6 Million	\$205.3 Million

Conversely, under the “upper-bound” sensitivity analyses that assumes better total effectiveness of indirect education and PSE strategies on reducing food insecurity and obesity rates (40 percent and 100 percent effectiveness relative to direct education respectively), indirect education benefits would rise from \$15.5 million to \$31.1 million under the five-year assumption and PSE strategy benefits would increase from \$23.9 million to \$47.8 million (**Table 2**). Combined with the previous five-year assumption results for direct education and social marketing campaigns, this “upper-bound scenario” in total benefits would amount to \$115.5 million in total future discounted economic benefits.

DISCUSSION

The results of these analyses show that SNAP-Ed programming is expected to produce meaningful future economic benefits from increased future earnings, increased life expectancy, and decreased future health care costs. Modeling the impact of changes in short-term behaviors such as daily fruit and vegetable consumption and weekly physical activity can be used alongside existing literature to predict long-term changes in lifepath outcomes such as earnings and health, albeit with some uncertainty as to the magnitude of total future benefits based on model inputs. While the changes in long-term health outcomes such as food insecurity and obesity impact only a small percentage of the participating population, the significant long-term savings from preventing each of these adverse events are shown to lead to large overall future program savings.

The magnitude of these SNAP-Ed program results is likely comparable to other public health interventions; for example, school-based nutrition education programs that have shown single-digit percentage impacts on child BMI in randomized evaluations.^{24,25} SNAP-Ed results on reducing food insecurity were also similar to prior works, although somewhat less effective than a recent, intensive educational program implemented at food pantries that found a 29 percent reduction in very low food insecurity for its participants (a somewhat different measure than this modeling’s definition of food insecurity).²⁶

The benefits accrue from all types of SNAP-Ed programming, including direct education classes, indirect educational outreach, PSE change strategies, and social marketing campaigns. Using



evidence on the impact of direct education classes regarding nutrition, physical activity, and food resource management, the results show that each of these focus areas can lead to population-level improvements in food insecurity and obesity. Among the major stakeholders, households and the private sector would be expected to receive the largest share of the benefits of reduced food insecurity and obesity prevalence, followed by the federal government and then state governments. When apportioned between health care spending and non-health benefits (earnings and longevity), the modeling results again show that SNAP-Ed programming has an economic impact through both of these pathways.

The results indicate a large range of possible benefits of the program, driven primarily by the alternative five- and ten-year assumptions regarding the persistence of obesity prevention following one year of SNAP-Ed interventions. As discussed in the **Appendix**, these assumptions are based on persistence estimates in the literature, some of which find that more than 80 percent of weight loss achieved from an intervention is regained within five years. Large differences in benefits between adults and children are also driven by these persistence assumptions: since persistence in children ends before they reach working age, their benefits include only reduced health care costs, and these cost savings are lower than for adults, for whom obesity presents greater health risks than for children.

Implications for Research, Practice, and Policy

The large and diverse set of future benefits found in the results of modeling Illinois SNAP-Ed programming impacts demonstrates the potential impact SNAP-Ed and similar programs can have on individual and population-level outcomes. These results show that preventive educational programming has the potential to reduce future adverse outcomes in a way that produces future economic benefits and is likely cost-saving, given the annual Illinois SNAP-Ed program budget.³ However, it is important to note that despite the significant total savings, these benefits take time to accrue (up to five years for the health care cost savings and even longer for many of the future earnings impacts), and these benefits are split among many major stakeholders. As a result, it is impossible for any single private stakeholder to recoup the total future economic benefits of preventing food insecurity and obesity, necessitating a role for federal and state investments in these prevention and education programs.

This work demonstrates that, depending on the SNAP-Ed total budget, future economic benefits may be sufficiently large to support a positive societal return on investment of SNAP-Ed and similar educational programming. This modeling, although incorporating data only on short- and medium-term outcomes in healthy behaviors to predict long-term economic change, provides a source of evidence that the educational programming is economically beneficial (in addition to providing a wide array of non-monetized benefits).^{23,27} However, the accuracy of these results is limited by a scarcity of uniform longitudinal data on the impact of SNAP-Ed interventions. In the future, if SNAP-Ed resumes or other similar programs form, additional data collection on specific outcomes for SNAP-Ed programming and its participants could improve the understanding of its economic impact. Specifically, more detailed behavior change findings for those taking part in indirect and PSE programming would allow for a more precise estimate of those components, while reducing uncertainty around total future economic benefits. Further, longer tracking of participants receiving all types of SNAP-Ed programming would benefit this work by providing greater evidence for the duration of benefits over time and any potential reversion to pre-intervention health behaviors/health outcomes.

The budget reconciliation bill that ended funding for the SNAP-Ed program after FY 2025 eliminates future economic benefits (and associated health benefits) described in this paper.¹ Before elimination of the program, the national SNAP-Ed budget had been set at \$550 million for FY



2026,²⁸ less than 0.5 percent of the overall SNAP budget.²⁹ This study provides evidence that the cancellation of the SNAP-Ed program is likely to not only increase food insecurity for low-income American families, but also result in a net economic loss to society.

The methods used in this study are generally applicable to similar initiatives designed to address shortcomings in the social determinants of health, including other community-based health programs. These methods use data from the initiatives themselves combined with literature describing the short- and long-term impacts of such investments to provide data for use in Altarum's Value of Health tool—the economic valuation tool used in this study.²² The tool has previously been used in studies of smoking and obesity prevention,³⁰ reducing childhood lead exposure,³¹⁻³³ and providing basic water and sanitation services in communities that currently lack them,³⁴ among others. Future applications could analyze other ongoing initiatives by federal, state, and local governments to address food insecurity and obesity.³⁵



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Appendix: Modeling Pathways and Sources

Modeling Pathway: Averting Food Insecurity

Prior literature has found that direct nutrition education interventions focused on food resource management can educate individuals on how to purchase healthy foods on a budget, prevent food waste, and stretch available financial resources so that a household is less likely to run out of food at the end of the month³⁶ and maintain greater skills to manage their available resources.³⁷ These benefits have been shown to directly decrease overall risk of food insecurity in the home by 6.8 percent for adults and 6.2 percent for youth.^{37,38} These decreases in food insecurity risk were used for modeling estimates of the impact of direct education on food insecurity, with indirect educational outreach approaches estimated to be 20 percent as effective as direct education, and PSE strategies 50 percent as effective.

To estimate the impact of food insecurity on the three lifepath trajectories (i.e., mortality risk, future health care spending, and annual earnings), the available evidence was used to describe impacts on youth and adults separately. For youth, food insecurity has been shown to negatively impact standardized test scores and grades at many levels,^{12,39,40} and this likely leads to the finding of lower graduation rates for college students¹⁴ and lower rates of “on track” progress to graduate for high school students.⁴⁰ It is estimated that food insecurity for individuals from ages 6 to 22 results in a decreased likelihood of matriculation or graduation by 37.5 percent, and that each missed graduation results in lost future earnings of 9.4 percent of annual earnings compared to an individual that graduated.^{41,42} Unlike health care costs and earnings impacts of obesity, these missed graduations are likely permanent; therefore, the modeling of these lost future earnings is considered for the entire lifetime of a SNAP-Ed participant’s earnings lifepath.

Alternatively, for food insecurity impacts on adults of all ages, there is stronger evidence linking insecurity with greater future health care costs. Assessments of food security status have found that adults experiencing food insecurity in one year have health care expenditures that are 19.5 percent higher in subsequent years compared to adults who are not food insecure.¹⁵ These additional health care costs accrue from increased spending on all types of care but are only significant for adults—the following-year spending difference for youth was negligible and insignificant in the prior evaluation. As such, the 19.5 percent increase in health care costs was applied for only the 18 and older population in the economic model.

The two above associations between food insecurity and graduation rates for youth and health care spending for adults were used to estimate changes to the two lifepaths for the appropriate age groups, calculating the future economic benefits of each averted case of food insecurity based on the difference between the health spending and lifetime earnings trajectories.

Modeling Pathway: Averting Obesity

SNAP-Ed programming includes two program focus areas that contribute to a reduction in obesity risk—nutrition and physical activity education. Model pathways were first constructed to estimate the extent to which SNAP-Ed direct education classes for each of these two topic areas were found to change short-term behaviors associated with obesity risk. For nutrition education, sufficient evidence was found to support the theoretical pathway from SNAP-Ed direct education classes to dietary behavioral changes through the proxy of average daily consumption of fresh fruits and vegetables for participants (measured in servings per day). Based on prior literature, participation in a direct education intervention is estimated to increase fresh fruit and vegetable consumption by 0.5



servings per day on average for both adults and youth.^{10,43,44} For physical activity, sufficient evidence was found linking direct education programming to overall physical activity behavior change, with evidence that SNAP-Ed direct education programming increases expected days per week of physical activity by 0.43 days a week for adults¹¹ and 0.95 days per week for youth.⁴⁵

SNAP-Ed indirect educational outreach is a more passive approach of promoting healthy diets and physical activity; it includes examples such as health fair-like informational booths and tabling events as well as educational flyers and handouts. The evidence of indirect education's effect on outcomes is more difficult to ascertain. It is likely that SNAP-Ed indirect education activities provide some benefit to participants in reducing future obesity risks, but at a much lower effect size than the more intensive direct educational classes. Due to the fact that no studies specifically assess the impact of indirect education approaches on fruit and vegetable consumption or days of physical activity were found, the effect size modeled for these components was based on a reduced effect of the direct educational literature above. Indirect education was modeled to provide an impact on all outcomes of 20 percent the size of similar direct education interventions, and alternative effectiveness percentages were considered in later sensitivity analyses.

Similarly, the effect of PSE strategies on healthy eating and physical activity outcomes was also more difficult to ascertain than the direct education classes. PSE strategies involve making changes to behavior-influencing policies, systems, and environments to support nutrition, physical activity, and food security that may be expected to have large impacts on individuals engaging with the changes, but to a more broadly defined population. While evidence has found some impact from specific PSE strategies on healthy behaviors,⁴⁶ and PSE strategies have the potential to result in large systematic changes,⁴⁷ the wide variety of PSE strategies employed by SNAP-Ed made it difficult to assess an average expected impact for the nutrition and physical activity pathways. As such, the prior approach of using a proportion of the effect sizes of a similar direct education intervention was followed for PSE strategies. In this case, 50 percent relative effectiveness per individual receiving a nutrition or physical activity PSE strategy was used and sensitivity analyses tested the impact of a range of relative effect sizes.

Lastly, data from prior studies of nutrition-focused social marketing messaging campaigns were used to estimate the effect size of this component of SNAP-Ed programming on changes in daily fresh fruit and vegetable consumption.^{48,49} For a previously evaluated social marketing campaign, individuals who recalled nutrition education messaging had an estimated increase of 0.5 servings per day of fresh fruits and vegetables.⁴⁸ For the physical activity pathway, corresponding evidence for an effect of social marketing messaging on physical activity outcomes was not found, and, as such, this pathway was not included.

The next step in the modeling was to estimate the expected impact of each additional daily serving of fresh fruits and vegetables and days per week of physical activity on obesity rates. While many of these studies are not causal in design (rather, they look at the association between short-term behaviors and obesity outcomes), there is strong evidence to show that improved diet quality⁵⁰ and physical activity^{46,51-54} are associated with lower average weight. For each additional 0.5 servings of fruit and vegetables per day, it is estimated that obesity risk falls by 6.1 percent for adults⁵⁵⁻⁵⁹ and 0.6 percent for youth.⁶⁰ For each additional day per week of physical activity, the model assumed an 8.8 percent reduction in future obesity risk for both adults and youth.⁶¹

When modeling the impacts of changes in diet and physical activity behaviors and obesity risk, it is not assumed these behavior and health changes last for an individual's entire lifetime. Instead, two approaches to estimate the duration of the health benefits for those receiving SNAP-Ed programming were used. The first approach leverages evidence from prior weight loss studies on similar



interventions that found weight loss impacts eventually waned over time, and that, on average, by the fifth year, 80 percent of the lost weight had been regained.^{55,56,58,59} The second approach uses assumptions from other similar economic modeling,⁶² wherein a ten-year time horizon was used to estimate the cost-effectiveness of varying childhood obesity interventions.

The above modeling links short-term behavior change to obesity risk and is used to estimate the share of SNAP-Ed participants who would be obese under the “intervention” and “no intervention” scenarios and the total estimated number of averted cases of obesity due to SNAP-Ed programming. First, obesity is found to contribute to greater mortality risk (at least 20 percent greater) than normal weight individuals, increasing the chances of premature death due to illness.³¹ Second, to estimate the economic impact of these averted cases, literature on the impact of obesity on mortality, future health care costs, and earnings was utilized. Based on work from the Congressional Budget Office, it was found that diabetes increases health care spending by 22.8 percent, with average health care costs being 38 percent higher in total, but only 60 percent of costs attributable to obesity-related conditions.¹⁷ The estimated effect of obesity on annual earnings found that due to a greater number of sick and missed work days (i.e., absenteeism) and lost productivity while at work (i.e., presenteeism), future annual earnings were 3.9 percent lower, a combination of 2.8 and 1.1 percent impacts from presenteeism and absenteeism, respectively.^{18, 20}

Other Input Data and Methods

To complete the economic models quantifying the future economic impacts of changes in obesity and food insecurity through the lifepath trajectory changes in future mortality, health care spending, and annual earnings, additional data on the baseline outcomes and health sector and economic assumptions were incorporated into Altarum’s Value of Health model.

To estimate the “non-obese” and “non-food-insecure” baseline outcomes pathways, data from a variety of federal government sources on typical lifepath health, longevity, and earnings trajectories were used, shown in **Appendix Table A1**. All benefits in future years are discounted using a 5 percent discount rate.

Appendix Table A1: Sources for Model Input Data

Model Input Data	Sources and Descriptions
Annual Per-Capita Health Spending, by Age	Agency for Healthcare Research and Quality (AHRQ) Medical Expenditure Panel Survey (2019), ⁶³ cubic-spline fit to single-age annual health spending estimates and Centers for Medicare and Medicaid Services (CMS) National Health Expenditure Data by State (Residence) ⁶⁴
Annual Per-Capita Earnings, by Age	U.S. Census American Community Survey, Illinois Residents (2019) ⁶⁵
Mortality Risk, by Age	Centers for Disease Control and Prevention (CDC) National Center for Health Statistics Mortality Data on CDC WONDER (2019) ⁶⁶
Health Insurance Shares	KFF State Health Facts, Health Insurance Coverage of the Total Population (2019) ⁶⁷
Federal/State Split in Medicaid Costs	KFF State Health Facts, Federal Medical Assistance Percentage (FMAP) for Medicaid (2019) ⁶⁸
Effective Marginal State and Federal Income Tax Rates	National Bureau of Economic Research (2019) ⁶⁹



Model Input Data	Sources and Descriptions
Obesity Rates, by Age	CDC Behavioral Risk Factor Surveillance System (2020), ⁷⁰ age groups matched as closely as possible to the SNAP-Ed administrative data age groups
Food Insecurity Rates, Youth & Adults	USDA Economic Research Service, Household Food Security in the United States in 2020 ⁷¹

Limitations

This approach to estimating the economic benefits of SNAP-Ed programming allows for modeling to predict future economic outcomes without tracking SNAP-Ed participants' behavior over extended time periods, but there are significant limitations. First, despite the effort to select the best studies to support the modeling, there remains uncertainty in the comparability of previous programs and evaluations to the way SNAP-Ed programming is administered in Illinois. If differences remain between the actual education classes and studies used to predict outcomes, the economic benefits could be misestimated. Further, while the identified studies show strong relationships between participation in SNAP-Ed programming and healthy behaviors and between those behaviors and health outcomes, not all of these studies were structured to make causal estimates of the impacts of behaviors on long-term health. As a result, these associations could overstate the impacts of SNAP-Ed programming that influence short-term behavior. Lastly, although sensitivity analysis to address uncertainty surrounding the persistence of changes in healthy behaviors was used, it is possible that five- and ten-year assumptions either over or underestimate the permanence of health changes and the value of future economic benefits.

Another limitation of the modeling that may undercount results is that changes in earnings and health spending outcomes were modeled through a single health status proxy (either obesity or food insecurity). For example, physical activity education is expected to increase physical activity levels, which may lead to improvements in a wide variety of health outcomes (e.g., via reductions in both obesity and cardiovascular disease risks). However, if reductions in future health spending from both of these health outcomes were modeled simultaneously, it would potentially overcount future savings, as many future health conditions that contribute to health spending are likely co-occurring. Therefore, in the modeling, estimates of changes in future outcomes through a single pathway for each program type are conservatively measured. Where additional health care conditions are associated with improved health behaviors, the observed health and economic outcome differences monetized in this economic model will account for some, but likely not all, of these additional benefits.

Finally, the model does not account for the benefits of all components of SNAP-Ed programming. For example, in the absence of prior literature on the effects of social marketing campaigns on physical activity and food resource management, these effects and populations were excluded from our analyses, which may conservatively undercount total future economic benefit calculations. Furthermore, our estimates are based on individuals who reached food security and obesity change thresholds. It is likely that even those showing lower levels of improvements in the areas modeled will also produce some future health and economic benefits that we have been unable to quantify.



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