

"The Governor Is *Very* Interested," or, Cost-Effectiveness Analysis for School Health Screenings

Case Study by Eric Weinberger for the Strategic Training Initiative
for the Prevention of Eating Disorders
www.hsph.harvard.edu/striped

TEACHING NOTE by Kendrin R. Sonnevile

This teaching note is written for teachers to give you all the information and guidance you need to adopt this case in your classroom. The teaching note covers background material on the case, including synopsis, explanation of its real-world basis, teaching objectives, target audience, and a listing of case materials and required readings for students. It also includes a detailed lesson plan for the teacher that is designed with a 1 hour and 50 minute session in mind. Of course teachers can modify the lesson plan to accommodate a shorter or longer class period. At the end of this teaching note are a written homework assignment and in-class assignment instructions. The written homework assignment should be assigned to students along with the required readings one week before the class session in which the case will be discussed. The in-class assignment instructions should be handed out to students at the start of the class period dedicated to discussion of this case.

A. Synopsis

School-based health screenings could be utilized to enhance detection of weight-related problems such as obesity and eating disorders among youth. As health care costs continue to rise, health care decision makers – governments, schools, parents, insurers – will increasingly request information about the benefits of body mass index (BMI) and eating disorders screening, and subsequent treatment, relative to its cost. "The Governor Is *Very* Interested" is a view into the work of a state agency in the (fictional) U.S. state of Columbia that is staffed by professionals but is still, as such agencies invariably are, subject to state politics, budgetary constraints, competing priorities, and what may appear to be the whims of politicians, who often say they are responding to the electorate. If the state's leaders want to get health screenings underway for students in the public schools, how does a state public health agency participate? What contribution can cost-effectiveness analysis make?

In this case, the protagonist Nefertiti Nelson, a senior Columbia Department of Public Health (CDPH) official directing budgetary and management affairs, has been given the job of examining the cost effectiveness of BMI and eating disorder screening. With prompting and assistance by the governor's office, she is working her way through a process along with assorted CDPH colleagues with expertise in public affairs, health communications, and data analysis. Soon she and her staff decide that an outside contractor is best suited for the analytical cost-effectiveness work on this project, which means finding and preparing a contractor (Melvin Kuo, whose firm is named Datamon). As the story unfolds, we see the key decision points that the consulting team from Datamon face and the interworking of the politics of spending money to improve the health of the public.

B. Real-World Basis

With the increase in the prevalence of obesity among children and adolescents over the past several decades in the United States and across the globe, researchers, medical providers, and governments worldwide are seeking novel methods to address this epidemic. The use of BMI report cards, where schools weigh and measure students and send parents an assessment of their child's risk for obesity, is one method that has been popular across the United States and internationally. Experts agree that parents should be informed of their child's weight status, yet there is considerable debate about how this information should be presented to parents and from whom it should come. Although several states have implemented BMI report card programs, few peer-reviewed studies evaluating their effectiveness have been published to date.

Eating disorders, while less common than obesity, are prevalent among adolescents. Eating disorders are a source of substantial morbidity and mortality and are costly to treat. Early diagnosis and timely treatment could decrease the economic and health burden of eating disorders on the population. Although population-based screening for eating disorders has been validated as a feasible method to identify at-risk adolescents who might benefit from early identification and treatment, eating disorder screening has historically not been conducted as part of routine school-based health screenings in the United States. In March of 2013, Virginia Governor Bob McDonnell signed a bill that requires information about eating disorders to be sent to parents of Virginia public school students in grades 5-12. The law also calls for the Virginia Department of Health to work with the National Eating Disorders Association and other stakeholders to develop a plan for implementing eating disorder screenings in schools. Experts believe that, in many states, amending existing BMI surveillance legislation or regulation to also include eating disorder screening may be one of the most viable policy approaches for enacting school-based eating disorder screening. This teaching case weaves together realistic story elements to help students understand key components of economic analysis. In addition, this case highlights considerations facing policy makers who must balance priorities such as population health and budgeting, a challenge relevant to many public health dilemmas.

C. Learning Objectives and Target Audience

The learning objectives of this teaching case include several that are specific to the topic of eating disorders prevention and several others that support core competencies for public health education promulgated by the U.S. Council on Linkages Between Academia and Public Health Practice (http://www.phf.org/resourcestools/Pages/Core_Public_Health_Competencies.aspx). The learning objectives specific to eating disorders prevention are: 1) Describe eating disorders and their prevalence among youth in the United States; 2) Explain how obesity and eating disorders are related (shared risk factors, co-occurrence, etc.); and 3) Discuss the high cost of eating disorder treatment and the potential savings of early detection. The learning objectives related to economic evaluation are: 1) Explain why cost-effectiveness analyses are performed in public health; 2) Discuss the importance of perspective and time horizon in cost-effectiveness analysis; 3) Explain how health outcomes are quantified; and 4) Describe basic principles of costing in cost-effectiveness analysis.

The learning objectives addressing Council on Linkages Between Academia and Public Health Practice core competencies are: 1) Advocates for the use of evidence in decision making that affects the health of a community (Analytical/Assessment Skills competency #1B15); 2) Gathers information for evaluating policies, programs, and services (Policy Development/Program Planning Skills competency #2A10); 3) Describes evidence used in developing, implementing, evaluating, and improving policies, programs, and services (Public Health Sciences Skills competency #6A6); 4) Uses financial analysis methods in making decisions about policies, programs, and services (Financial Planning and Management Skills competency #7B10).

The primary target audience for this teaching case is graduate students in public health, particularly those in courses focused on child and adolescent health, health policy, school health, public health nursing, program evaluation, decision sciences, and health economics. The case is also suitable for graduate students in other disciplines, such as education, and undergraduate students in similar courses. The case and assignments can be adapted for use with advanced high school students in a course on public health or economics. The teaching case may have its greatest impact when reaching students who are likely to one day work in professional roles where they are involved in health policy making or in economic analysis of public health programs or policy.

D. Case Materials

The complete case study consists of the case study narrative with five sections, a teaching note, which includes a lesson plan, homework assignment, and in-class activity instructions, plus one companion technical document that is available at no cost on the Internet.

Provided Teaching Case Narrative Document:

- 1) Cover page, plus table of contents, synopsis, and acknowledgments (3 pages)
- 2) Cast of characters (1 page)
- 3) Case study narrative "The Governor Is *Very* Interested' or, Cost-Effectiveness Analysis for School Health Screenings" (11 pages)
- 4) Newspaper report, Columbia legislative session on new fiscal year budget (2 pages)
- 5) Datamon Consulting Checklist (1 page)

Provided Teaching Note Document: Includes overview material, lesson plan, written homework assignment, and in-class assignment instructions (19 pages). In addition to the provided materials and required readings listed below for students, teachers who are new to teaching about economic analysis may find the following resource helpful: Edwards RT, Charles JM, Lloyd-Williams H. Public health economics: A systematic review of guidance for the economic evaluation of public health interventions and discussion of key methodological issues. *BMC Public Health*. 2013;13(1):1001. Keep in mind that teachers can modify the lesson plan and assigned readings to accommodate a shorter or longer class period or to spread the case out over two class periods to spend more time introducing key concepts.

E. Required Reading for Students

- 1) Provided case study narrative document with five sections.

2) Companion technical document: U.S. Department of Health and Human Services. *Guide to Analyzing the Cost-Effectiveness of Community Public Health Prevention Approaches* (2006). Research Triangle Park, NC. Required reading for homework assignment: Chapters 1-2 and Chapters 4-5 (Available at no cost at: URL: <http://aspe.hhs.gov/health/reports/06/cphpa/report.pdf>).

3) Peer-reviewed journal articles:

- Austin SB, Ziyadeh NJ, Forman S, Prokop LA, Keliher A, Jacobs D. Screening high school students for eating disorders: Results of a national initiative. *Preventing Chronic Disease*. 2008;5(4):A114. Key teaching points from article:
 - The National Eating Disorders Screening Program, the first national screening program for eating disorders held in high schools across the United States, found that almost 1 in 4 girls and 1 in 10 boys reported at least 1 disordered eating or weight control symptom serious enough to warrant further evaluation by a health professional.
 - A large proportion of symptomatic students had never been treated for an eating disorder.
 - National screening for eating disorders in high schools reached a large number of students who were likely to have symptoms of disordered eating and weight control and may offer a critical public health strategy to improve prognosis by shortening the interval between symptom onset and treatment.

- Nihiser AJ, Lee SM, Wechsler H, McKenna M, Odom E, Reinold C, Thompson D, Grummer-Strawn L. BMI Measurement in Schools. *Pediatrics*. 2009;124(Supplement 1):S89-S97. Key teaching points from article:
 - School-based BMI measurement has attracted attention across the nation as a potential approach to address obesity among youth; little is known about its impact or effectiveness in changing obesity rates.
 - A number of concerns have been expressed about school-based BMI-screening programs, including that they might:
 - intensify the stigmatization already experienced by many obese youth
 - increase dissatisfaction with body image
 - intensify pressures to engage in harmful weight-loss practices that could lead to eating disorders
 - result in an inappropriate response by parents
 - waste scarce health-promotion resources
 - distract attention from other school-based obesity-prevention activities
 - BMI-surveillance programs (BMI measured, but assessment is not sent to parents) are less controversial, because they do not involve the communication of sensitive information to parents and do not require follow-up care.

- Neumark-Sztainer DR, Wall MM, Haines JI, Story MT, Sherwood NE, van den Berg PA. Shared risk and protective factors for overweight and disordered eating in adolescents. *American Journal of Preventive Medicine*. 2007;33(5):359-369.e353. Key teaching points from article:
 - The prevalence of weight-related problems, including overweight, binge eating, and extreme weight-control behaviors, was found to be high among adolescents, indicating a need for interventions aimed at their prevention, early identification, and treatment.
 - Weight-related behaviors often co-occur among adolescents; about 40% of overweight girls and 20% of overweight boys engaged in at least one of the disordered eating behaviors (binge eating and/or extreme weight control).
 - Shared longitudinal risk factors for the development of weight-related problems in girls and boys included weight-related pressures within an adolescent's social environment, personal weight and body concerns, and use of dieting and unhealthy weight-control behaviors.

- Stuhldreher N, Konnopka A, Wild B, Herzog W, Zipfel S, Löwe B, König HH. Cost-of-illness studies and cost-effectiveness analyses in eating disorders: A systematic review. *International Journal of Eating Disorders*. 2012;45(4):476-491. Key teaching points from article:
 - As a consequence of eating disorders, physical comorbidities develop frequently, including osteoporosis, osteopenia, cardiovascular, and renal problems.
 - Eating disorders are often associated with other psychiatric condition, such as major depressive disorder, personality disorders, or anxiety disorders, especially obsessive compulsive disorder.
 - Eating disorders are associated with a high risk of suicide and elevated overall mortality rates.
 - Eating disorders create substantial costs, even though the available evidence probably underestimates the economic burden; comprehensive evaluations of direct and indirect costs are still lacking.

- Wright DR, Austin SB, LeAnn Noh H, Jiang Y, Sonnevile KR. The Cost-Effectiveness of School-Based Eating Disorder Screening. *American Journal of Public Health*. 2014;17:e1-e9. Key teaching points from article:
 - The cost-effectiveness of school-based eating disorder screening are conservatively estimated to be \$9041 per life-year with an eating disorder avoided and \$56 500 per QALY gained.
 - School-based eating disorder screening is feasible and relatively and cost-effective; school-based eating disorder screening is less costly than some mental health screening programs and as cost-effective as other screening interventions that target adolescent females.
 - School-based eating disorder screening may reduce disparities in access to care among male, minority, and overweight adolescents.

- (Optional) Students interested in school-based BMI screening can refer to the Massachusetts Department of Public Health *BMI Screening Guidelines* (Available at:

<http://www.mass.gov/eohhs/docs/dph/com-health/school/bmi-screening-guidelines-for-schools.pdf>).

E. Acknowledgments and Funding

This teaching case was written by Eric Weinberger for the Strategic Training Initiative for the Prevention of Eating Disorders (STRIPED; www.hsph.harvard.edu/striped) and the homework and in-class activity assignments by Dr. Mihail Samnaliev under the direction of STRIPED director S. Bryn Austin and co-director Kendrin R. Sonneville. We would like to thank reviewers for this case: Debra Franko, Jess Haines, Nancy Kane, Michael Long, Susan Madden, Dianne Neumark-Sztainer, LeAnn Hyungi Noh, Susan Paxton, Mihail Samnaliev, and Davene Wright. We also thank Michael Long, Nancy Street, and all the students in Analysis of Public Health Issues (HP 606) at Regis College for their participation in the pilot evaluation of this teaching case. This work was supported by the Ellen Feldberg Gordon Fund for Eating Disorders Research and grants T71-MC-00009 and T76-MC00001 from the Maternal and Child Health Bureau, Health Resources and Services Administration, U.S. Department of Health and Human Services.

F. Lesson Plan and Discussion Guide

Lesson Plan (1 hour 50 minutes)
--

1. Opening Whole Class Discussion (30 minutes)

- a. Introduction to Case and Initial Discussion: In class today, we will be focusing on our case “The Governor Is *Very Interested*” about the fictional U.S. state of Columbia and its economic evaluation of school-based BMI and eating disorder screening policies. In preparation for this class, you read four peer-reviewed journal articles related to eating disorders, obesity, screening, and cost-effectiveness. Let's briefly talk through key points from the readings. As we go through the articles one by one, share any insights you gained from the readings (use probe questions such as "What did you learn?" or "Did anything surprise you?"; write key points shared on the board).
- b. Although you may have experience with assessing the effectiveness of interventions, you may be less familiar with estimating costs. For your homework assignment, you did the initial work of estimating the cost effectiveness of the screening interventions. Ignore for a moment the details of calculating costs and think more broadly about the relevance of cost to public health.
 - Q: What do you think is the value in public health of assessing costs in addition to assessing effectiveness?
 - Q: Should public health professionals promote policies or programs that are the most effective or those that are the best value for the dollar?
- c. In the homework, you looked at several decision points in CEA.
 - Perspective (Payer versus societal)
 - Q: What is the relevance of examining these different perspectives?
 - Q: Are the stakeholders who pay and those who benefit different in the case of school-based screening?
 - Timeframe
 - Q: What are the advantages of doing a 1-year as opposed to 5-year CEA?
 - Q: What are the advantages of including long-term costs and effects?

2. Cost Versus Cost-Effectiveness Debate (30 minutes)

- New interventions are often more expensive than current practice. In the homework, BMI and combined BMI and eating disorder screening are projected to cost both the state government and schools \$200 million and \$300 million, respectively, each year. Both BMI and BMI + eating disorder screening are estimated to be cost-effective in the long run, however, suggesting that they should be implemented. Keeping in mind that CEA is just one tool to aid in decision-making, but does not give us all the answers, we will be debating the merits of enacting an expensive, yet cost-effective program.

- Break up the class into groups of five (assuming class of 20, have students count off by four to create four groups of five). *(3 minutes for introduction and breaking into groups)*.
- Have each group draw a slip of paper that contains one of two positions related to implementing the BMI and eating disorder screening policy *[see page 14 of teaching note]*.
 - **Position A:** Take the position that the state cannot afford to implement BMI and eating disorders screening, given its high cost in the state budget.
 - **Position B:** Defend the argument that the state should screen for BMI and eating disorders, based on the findings that it is cost-effective in the long run. Where would the money come from to pay for screening?
- Distribute the answer key for the homework tables and data Tables 5 and 6 of prevalence and mortality, which may be used to help support these positions *[see page 15-17 of teaching note]*.
- Before talking with their group, give students 2 minutes to individually jot down notes related to their assigned question and the position they will be debating. Next, give each group 10 minutes to discuss their position. Ask the group to summarize their argument in 3-4 bullet points and have each group select a spokesperson to debate their position.
- Reconvene the class and ask the spokespeople to share their bullet points, alternating through each group between position A and B. Write key points of the arguments on the board as groups report out. If time allows, provide groups an opportunity to rebut arguments presented by the opposing position. *(10 minutes)*
- Lead discussion with the full class. *(5 minutes)*
 - Q: Which arguments presented by either side were most compelling?
 - Q: How much should costs factor into decisions about health-related policy?
 - Q: Should we have any concerns about putting a dollar value on outcomes such as preventing obesity or eating disorders?

3. Second Stage Filter Analysis: *(30 minutes)*

- To place the incremental cost-effectiveness ratios calculated using CEA within a broader decision-making framework, an assessment of issues related to resource allocation can be conducted. One type of assessment, which has been termed second stage filter analysis, involves assessing policies on features such as health equity, feasibility of implementation, acceptability to stakeholders, sustainability, and potential for unintended negative consequences.

- Break up into groups of four (assuming class of 20, have students count off by five to create five groups of four; *groups should be different than the groups used for the cost versus cost-effectiveness debate*). Groups should complete a second stage filter analysis of the eating disorder and BMI screening policy using the criteria included in the attached grid. (15 minutes) (Pass out in-class activity directions and template [see pages 18 and 19 of teaching note]).
- While students are working in groups, draw a large grid resembling the second stage filter analysis template on a poster board, dry erase board, or black board.
- Reconvene the whole class and ask each group to share their notes from the grid. As the groups report back on their discussion of the second stage filters, write down key themes reported in the second stage filter analysis template drawn on board so that all ideas are represented in one large grid. (15 minutes)
- Once all groups have shared the results of their discussion, lead discussion with the full class. (10 minutes)
 - Q: What do you think is the purpose of second stage filter analysis?
 - How might it help with decision making?
 - Are there other considerations or filters you think should be included as part of this analysis?
 - Imagine you are in Nefertiti Nelson's shoes and are responsible for deciding whether to enact an expensive health-related policy.
 - How do you weigh the results of the CEA with these second stage filters?

5. Free Write, Discussion, and Wrap-up (10 minutes)

- Have students take out a piece of paper they can turn in at end of class, put their names on paper, and write their response to the following question: (3 minutes)
 - What do you think were the ethical issues, if any, in our case "The Governor Is Very Interested?" Explain your reasoning.
- Discuss Free Write responses together (7 minutes)
 - Q: What are some of the responses you came up with?
 - What are the ethical issues related to spending public money?
 - Do you have any ethical reservations about monetizing health or putting a dollar value on outcomes such as preventing obesity or eating disorders?

END CASE DISCUSSION

"The Governor Is *Very* Interested," or, Cost-Effectiveness Analysis for School Health Screenings

WRITTEN HOMEWORK ASSIGNMENT: Exercise to Estimate Cost-Effectiveness of School-Based BMI and Eating Disorder Screening

Due Date:

Length: Completed Tables 1-4 plus 1 page summary of the results (typed, double-spaced, 12-point font, one-inch margins)

Nefertiti Nelson and her Columbia Department of Public Health (CDPH) colleagues are working with Melvin Kuo and your consulting team at Datamon to examine the cost effectiveness of BMI and eating disorder (ED) screening in schools. The following exercise will illustrate the basic steps of cost-effectiveness analysis (CEA) that you will conduct as part of the consulting team at Datamon. Costs and effects are estimated for three strategies: no screening (the status quo), BMI screening, and combined BMI and ED screening. Further, the analyses are conducted over two evaluation periods (1 and 5 years) and from two different perspectives (payer and societal).

Requirements

A valuable tool for any student or practitioner of public health is the *Guide to Analyzing the Cost-Effectiveness of Community Public Health Prevention Approaches* (2006), a publication from the U.S. Department of Health and Human Services that is available online at:

<http://aspe.hhs.gov/health/reports/06/cphpa/report.pdf>. You are required to read the following:

- Chapters 1-2 (pp. 1-1 – 1-3, 2-1 – 2-9)
 - Chapters 4-5 (pp. 4-1 – 4-7, 5-1 – 5-11)
1. Conduct a brief literature search to identify research support for early detection, specifically as it relates to improved treatment outcomes or reduced suffering, harm, or costs for eating disorders and obesity. Cite this research in the opening 2-3 sentences of your 1 page summary.
 2. As discussed in Chapter 4 in the *Guide to Analyzing the Cost-Effectiveness*, calculations of costs in CEA often start with a list of all relevant resources necessary to execute the screening program. For the purposes of this homework assignment, we will assume that screening is followed by effective intervention/treatment among students found to have BMIs greater than the 95th percentile for age and sex or to have ED symptoms. Also all other medical care utilization that is not part of the screening program and related treatment but might change as a consequence of the screening program should be included. Finally, non-health impacts/costs should also be listed.

Fill in Table 1 by listing the resources that you think are relevant in this example. Group them into three categories:

- i. Program-related (resources needed to screen for and treat elevated BMI and EDs)
 - ii. Future medical care (prevented use of health care resources associated with reduced BMI and treated ED)
 - iii. Non-health impacts/costs (avoided non-health costs associated with reduced BMI and ED)
3. Also discussed in Chapter 4, the next step in cost-effectiveness analysis (CEA) is to estimate the costs associated with the resources above. Assume that these costs have already been calculated and aggregated as in Table 2 (note that the figures are hypothetical and include screening and treatment for children with ED and those with BMI \geq 95th percentile). Estimate the total costs associated with each strategy by filling in the empty cells in table 2.1.

Payers (in this case, schools and government) are often interested in the overall cost impact of new programs on their budgets. Assume that the screening program is estimated to result in 200,000 children being screened in the entire state. Estimate the overall cost (budget) impact of screening on schools and on the government by filling in Table 2.2.

4. The next step in CEA is to estimate the effectiveness associated with each screening program and related treatment. The measure of effectiveness we will use here is quality-adjusted life years (QALYs) as described in Chapter 5 of the *Guide to Analyzing the Cost-Effectiveness* and in line with recommendations by the US Panel on Cost-Effectiveness. Estimate the life expectancy and QALYs associated with no screening, BMI, and BMI + ED screening by filling in the shaded cells in Table 3. To estimate QALYs you need to multiply life expectancy (number of years within the evaluation period) by quality of life.

Life expectancy

- The 1-year evaluation assumes that there is no difference in life expectancy across alternatives (life expectancy=1).
- The 5-year evaluation assumes that life expectancy is 5 years when both BMI and ED screening are provided, but decreases to 4.8 years when only BMI screening is provided and to 4.6 years when there is no screening. This scenario is based on the assumption that failure to treat ED as well as very high BMI might lead to life-threatening conditions and higher mortality rate.

Quality of life

Typically scored on a scale from 0 (death) to 1 (perfect health); assume the following:

- Quality of life (no screening) = 0.701 for each of the 4.6 years
- Quality of life (following BMI screening) = 0.703 for the first 2 years and 0.700 for the remaining 2.8 years
- Quality of life (following BMI and ED screening) = 0.706 for the first 2 years and 0.7 for the remaining 3 years

5. The next step in CEA is the incremental cost-effectiveness ratio (ICER), as described on page 5-5 in the *Guide to Analyzing the Cost-Effectiveness*. ICER represents the additional costs associated with a one unit increase in effectiveness. In this example it shows how much the payer needs to spend to gain one QALY. For example:

$$\text{ICER} = \frac{\text{TotalCost}_{\text{BMI screening}} - \text{TotalCost}_{\text{No screening}}}{\text{QALYs}_{\text{BMI screening}} - \text{QALYs}_{\text{No screening}}}$$

Fill in Table 4 by doing the following:

- Calculate the incremental costs of BMI screening vs. no screening, and BMI and ED screening vs. no screening to payers (schools and government) and society by subtracting the per person cost of no screening from the costs of BMI screening alone or BMI and ED screening combined (columns 2 and 3).
- Calculate incremental QALYs of BMI screening vs. no screening, and BMI and ED screening vs. no screening by subtracting the QALYs of no screening from the QALYs of BMI screening alone or BMI and ED screening combined (column 4).
- Calculate the ICER of BMI screening vs. no screening, and BMI and ED screening vs. no screening from a payer (by dividing column 2 by column 4) and a societal (by dividing column 3 by column 4) perspective (columns 5 and 6, respectively).

6. Summarize the results

Suggested format:

- (i) Provide basic evidence of the benefits of early detection and treatment with citations from the research literature (2-3 sentences)
- (ii) State the background and the goal of the analysis (1-2 sentences)
- (iii) List the categories of costs that were included in your calculations (1-2 sentences)
- (iv) Explain how QALYs were calculated (2 sentences)
- (v) Discuss the added costs associated with screening and treatment, as well as the medical care and non-health benefits (2 sentences)
- (vi) Describe the estimation of ICER (1-2 sentences)
- (vii) Discuss the effect of the length of evaluation and the perspective of analysis (2 sentences)
- (viii) Summary and recommendations to the government (1-2 sentences)

“The Governor Is *Very* Interested,” or, Cost-Effectiveness Analysis for School Health Screenings

Data Tables for Homework Assignment

Table 1. Resources associated with BMI and ED screening in public schools

Screening-related	Future medical care ¹	Non-health costs

¹Excluding medical care that is part of the screening-related intervention.

Table 2.1. Average per person costs (hypothetical estimates)

	Screening-related ¹		Medical care ²	Non-health	Total societal costs
	Schools	State government	Patients or/and insurers	Patients	
1 year					
No screening	\$0	\$0	\$300	\$400	
BMI screening	\$200	\$200	\$200	\$300	
BMI & ED screening	\$300	\$300	\$100	\$100	
5 years³					
No screening	\$0	\$0	\$1,000	\$1,000	
BMI screening	\$200	\$200	\$800	\$700	
BMI & ED screening	\$300	\$300	\$200	\$500	

¹Assuming one-time screening and treatment, if necessary. These costs are expected to be incurred in the first year, and therefore do not change over longer evaluation periods.

²Excluding medical care that is part of the screening-related intervention.

³Assume that the costs in the 5-year time frame have already been discounted to present value (see 2.3.4 of companion technical document).

Table 2.2. Total screening-related cost of screening 200,000 children

	Schools	State government
BMI screening		
BMI and ED screening		

Table 3. Estimation of QALYs

Length of evaluation	Life expectancy	QALYs ¹
1 year		
No screening		
BMI screening		
BMI and ED screening		
5 years		
No screening		
BMI screening		
BMI and ED screening		

QALYs = quality-adjusted life years

¹For example, QALYs = 0.703 x 2 years + 0.700 x 2.8 years for BMI screening over 5 years where life expectancy=4.8.

Table 4. Incremental costs, QALYs, and ICER

Length of evaluation	Incremental costs to payers ¹	Incremental societal costs ²	Incremental effectiveness (QALYs)	ICER payer perspective	ICER societal perspective
1 year	-	-	-	-	-
No screening	-	-	-	-	-
BMI screening					
BMI and ED screening					
5 years	-	-	-	-	-
No screening	-	-	-	-	-
BMI screening					
BMI and ED screening					

ICER = incremental cost-effectiveness ratio

QALYs = Quality-adjusted life years

¹Payer costs here include ones borne by schools and the state government.

²Societal costs include payer, medical care costs, and non-health costs.

Debate Positions: To Be Used During In-Class Activity

Position A: Take the position that the state cannot afford to implement BMI and eating disorder screening, given its high cost in the state budget.

Position B: Defend the argument that the state should screen for BMI and eating disorders, based on the findings that it is cost-effective in the long run. Where would the money come from to pay for screening?

Answer Key for Homework Tables: To Be Distributed During In-Class Activity

Table 1. Resources associated with BMI and ED screening in public schools

Screening-related	Future medical care ¹	Non-health costs
Staff training Computers/software for data entry Staff time to conduct screenings Scales, stadiometers Privacy screens Printing costs for screening instrument Post-screening mailings	Treatment co-morbidities Appointments with sub-specialty, mental health, and ancillary providers Medication Co-payments	Wages Work productivity

¹Excluding medical care that is part of the screening-related intervention.

Table 2.1. Average per person costs (hypothetical estimates)

	Screening-related ¹		Medical care ²	Non-health	Total societal costs
	Schools	State government	Patients or/and insurers	Patients	
1 year					
No screening	\$0	\$0	\$300	\$400	\$700
BMI screening	\$200	\$200	\$200	\$300	\$900
BMI & ED screening	\$300	\$300	\$100	\$100	\$800
5 years³					
No screening	\$0	\$0	\$1,000	\$1,000	\$2000
BMI screening	\$200	\$200	\$800	\$700	\$1900
BMI & ED screening	\$300	\$300	\$200	\$500	\$1300

¹Assuming one-time screening and treatment, if necessary. These costs are expected to be incurred in the first year, and therefore do not change over longer evaluation periods.

²Excluding medical care that is part of the screening-related intervention.

³Assume that the costs in the 5-year time frame have already been discounted to present value (see 2.3.4 of companion technical document).

Table 2.2. Total screening-related cost of screening 200,000 children

	Schools	State government
BMI screening	\$40,000,000	\$40,000,000
BMI and ED screening	\$60,000,000	\$60,000,000

Table 3. Estimation of QALYs

Length of evaluation	Life expectancy	QALYs ¹
1 year		
No screening	1	.701
BMI screening	1	.703
BMI and ED screening	1	.706
5 years		
No screening	4.6	3.225
BMI screening	4.8	3.366
BMI and ED screening	5	3.512

QALYs = quality-adjusted life years

¹For example, QALYs = 0.703 x 2 years + 0.700 x 2.8 years for BMI screening over 5 years where life expectancy=4.8.

Table 4. Incremental costs, QALYs, and ICER

Length of evaluation	Incremental costs to payers ¹	Incremental societal costs ²	Incremental effectiveness (QALYs) ³	ICER payer perspective ³	ICER societal perspective ³
1 year	-	-	-	-	-
No screening	-	-	-	-	-
BMI screening	400	200	.002	200,000	100,000
BMI and ED screening	600	100	.005	120,000	20,000
5 years	-	-	-	-	-
No screening	-	-	-	-	-
BMI screening	400	-100	.1414	2,829	-707
BMI and ED screening	600	-700	.2874	2,088	-2,436

ICER = incremental cost-effectiveness ratio

QALYs = Quality-adjusted life years

¹Payer costs here include ones borne by schools and the state government.

²Societal costs include payer, medical care costs, and non-health costs.

³ICER values calculated may differ slightly due to rounding.

Data Tables of Prevalence and Mortality: To Be Distributed During In-Class Activity

Table 5. Lifetime prevalence of eating disorders¹ and prevalence of elevated body mass index (BMI) percentiles in U.S. children²

Lifetime prevalence by age group (years), % (standard error)					
	Anorexia Nervosa (AN)	Bulimia Nervosa (BN)	Binge Eating Disorder (BED)	Sub threshold AN	Sub threshold BED
13-14 y	0.3 (0.12)	0.8 (0.25)	1.4 (0.39)	0.6 (0.15)	2.4 (0.45)
15-16 y	0.3 (0.12)	0.9 (0.21)	1.6 (0.28)	0.9 (0.19)	2.5 (0.33)
17-18 y	0.2 (0.10)	0.9 (0.21)	1.9 (0.38)	1.1 (0.18)	2.5 (0.42)
Prevalence of elevated BMI percentile by age group (years), % (95% confidence interval)					
	≥85 th percentile (overweight)	≥95 th percentile (obese)	≥97 th percentile (extremely obese)		
6-11 y	32.1 (28.0-37.6)	15.8 (13.7-18.0)	11.3 (9.4-13.4)		
12-19 y	32.6 (28.0-37.6)	17.1 (14.4-20.1)	11.2 (9.2-13.7)		

Table 6. Standardized mortality rate of eating disorders³ and hazard ratios of all-cause mortality by BMI category⁴

Standardized mortality rate (95% confidence interval)	
Anorexia Nervosa	5.86 (4.17-8.26)
Bulimia Nervosa	1.93 (1.44-2.59)
Eating disorders, Not otherwise specified (including BED and sub threshold conditions)	1.92 (1.46-2.52)
Hazard ratios of all-cause mortality (95% confidence interval)	
Normal weight (18.5 to <25)	1.0 (REF)
Overweight (BMI 25 to <30)	0.94 (0.91-0.96)
Obese (BMI 30 to 35)	0.95 (0.88-1.01)
Extremely obese (BMI >35)	1.29 (1.18-1.41)

1. Swanson SA, Crow SJ, Le Grange D, Swendsen J, Merikangas KR. Prevalence and correlates of eating disorders in adolescents. Results from the national comorbidity survey replication adolescent supplement. *Arch Gen Psych.* 2011;68(7):714-723.
2. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of obesity and trends in body mass index among US children and adolescents, 1999-2010. *JAMA.* 2012;307(5):483-490.
3. Arcelus J, Mitchell AJ, Wales J, Nielsen S. Mortality rates in patients with anorexia nervosa and other eating disorders: A meta-analysis of 36 studies. *Arch Gen Psych.* 2011;68(7):724-731.
4. Flegal KM, Kit BK, Orpana H, Graubard BI. Association of all-cause mortality with overweight and obesity using standard body mass indices categories: A systematic review and meta-analysis. *JAMA.* 2013;309(1):71-82.

“The Governor Is *Very* Interested,” or, Cost-Effectiveness Analysis for School Health Screenings

IN-CLASS ACTIVITY: Conducting a Second Stage Filter Analysis of BMI and Eating Disorder Screening in Public Schools

For your homework, you completed a CEA-related problem set and discussed important CEA-related decision points from your readings, including determining the time frame and analytic time period and identifying the study perspective. In class, you will be working with your colleagues from CDPH to place the incremental cost effectiveness ratios provided by the Datamon team within a broader decision-making framework called second stage filter analysis. The second stage filter analysis involves the assessment of issues that need to be taken into account in decision-making about resource allocation, such as health equity, feasibility of implementation, acceptability to stakeholders, sustainability, and potential for unintended negative consequences.

For the next 15 minutes, you and your team will be discussing key considerations related to each of these filters and will be completing the attached Second Stage Filter Analysis Template, which also includes a description of the filters. Be sure to choose a note taker and timekeeper for your meeting. Be prepared to report back to the class on your discussion of each of the filters.

Second Stage Filter Analysis Template: To Be Completed by Each Team During In-Class Activity

Second Stage Filter	Key Considerations	
	BMI Screening	ED Screening
<p>Health equity <i>Could eating disorder screening and BMI screening impact the inequity of distribution of eating disorders and obesity? What impact will screenings have on detection and or/treatment utilization? Who is most likely to benefit?</i></p>		
<p>Feasibility of implementation <i>How feasible would it be to implement the screening? Consider factors such as the availability of appropriate expertise to implement the screening, competing interests with schools, the degree of environmental or structural change required.</i></p>		
<p>Acceptability to stakeholders <i>What is the anticipated acceptability of the screenings to stakeholders? Consider stakeholders such as children and adolescents, parents, teachers, school nurses, the general community, third-party funders, health service providers, government, and the private sector.</i></p>		
<p>Sustainability <i>How durable is the screening program? Consider factors such as the level of ongoing funding support required and the likelihood of required changes in practices being achieved on an ongoing basis.</i></p>		
<p>Potential for unintended consequences <i>What are the potential negative side effects that may occur as a result of the intervention? Consider impacts such as other health consequences, environmental consequences, and other unmeasured economic consequences.</i></p>		