

## CDC Coffee Break: Introduction To Economic Evaluation

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Welcome to today's Coffee Break presented by the Evaluation and Program Effectiveness Team in the Division for Heart Disease and Stroke Prevention at the Centers for Disease Control and Prevention.

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**Disclaimer: The information presented here is for training purposes and reflects the views of the presenter. It does not necessarily represent the official position of the Centers for Disease Control and Prevention.**

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## **Economic Evaluation Is...**

- ❑ **A tool to make comparisons.**
- ❑ **Used to ensure society can receive a good return on its investment in public health.**

As public health practitioners, we care about improving the health of the entire population, so we try to maximize desired health outcomes of society. But why should we care about economic evaluation in public health? All public health programs, policies, and interventions have costs or financial investments, and the reality is that our resources are limited and they can be used for many different purposes. Decision makers and practitioners need information about the cost of potential strategies as well as their effectiveness to ensure that good value is obtained for the resources invested in such strategies. Another way to say this is that we care about returns on society's investments in public health.

Economic evaluation methods provide a systematic way to identify, measure, value, and compare the costs and consequences of various programs, policies, or interventions.

## **What Will Be Covered in This Presentation**

- ❑ **Cost of illness**
- ❑ **Return on investment**
- ❑ **Analytic perspective**
- ❑ **Cost analysis**
- ❑ **Cost effectiveness analysis**
- ❑ **Cost benefit analysis**
- ❑ **Cost utility analysis**
- ❑ **Resources for self-study**
- ❑ **Q&A session**

I will begin today with a brief overview of how surveillance and evaluation relate to economic evaluation. Then I will look at return on investment calculations and focus on the importance of choosing the appropriate perspective for an economic analysis. I will highlight key features of cost analysis, cost effectiveness analysis, cost benefit analysis, and cost utility analysis. Finally, I will share several resources available for further study.

### **As a Note**

**Today's session is an introduction,  
and not a "how to" session.**

One word of caution, however. This Coffee Break presentation is a brief introduction to economic evaluation and not a "how to" training.

## Surveillance and Economic Evaluation

- ❑ **Surveillance data is used to describe the “burden of disease” including incidence, prevalence, and mortality rate.**
- ❑ **It is also used to calculate “costs of illness” including direct and indirect medical costs.**

**Surveillance data** can be used to describe the “burden of disease” expressed in terms of the incidence, prevalence, and mortality rate of a disease. In addition, surveillance data is needed to estimate the medical costs of illness and factors such as lost productivity from illness, disability, or death. A particular type of burden-of-disease measure that is relevant to economic evaluation is called a “**Cost of illness**” estimate. Thus, surveillance data plays an important role in public health economic analysis.

## Evaluation and Economic Evaluation

- ❑ **Interventions are created to reduce the burden of disease or costs of illness.**
- ❑ **Program evaluation and scientific studies assess effectiveness and answer:**
  - What works?
  - What is the size of the impact?

To address the burden of disease, public health interventions can be developed and implemented. **Evaluation** methods can be used to assess whether a strategy is effective in addressing a disease or condition, and the size of the impact. This is called an effectiveness evaluation and answers the question “what works and what is the size of the impact?”

## Other Considerations

- ❑ **You still need to consider that different interventions have different costs and different levels of effectiveness.**
- ❑ **How do you choose?**

To summarize, surveillance data can be used to assess the burden of disease, and evaluation methods can be used to assess the effectiveness of an intervention in achieving desired health outcomes. Different intervention strategies may have different costs, different levels of effectiveness, and different consequences. Economic evaluation is a tool to assess the cost factors related to different interventions, enabling comparisons to be made among potential strategies. Ultimately, the aim of economic evaluation in public health is for society to receive a good **return on its investment**.



## Return on Investment (ROI)

- ❑ ROI is a personal financial investment concept where the goal is to maximize gain (\$) for the investor without regard to other considerations.

$$\text{Formula: } \frac{\$ \text{ Gained} - \$ \text{ Cost of Investment}}{\$ \text{ Cost of Investment}} = \text{ROI}$$

- ❑ **Caution:** It's easy to manipulate the calculation depending on what counts as "gain" and what counts as "cost."

Return on investment is a concept from personal investing where the intent is to maximize gain (or money earned on an investment) in relation to the cost of the investment. The net gain is divided by the cost of the investment to calculate the return on investment. ROI is often used in marketing different types of financial investments. However, caution is needed in interpreting ROI because the calculation can be easily changed by manipulating what counts as a "gain" and what counts as a "cost."

## Types of Economic Evaluation Methods

Type of Economic Analysis	Results Are Expressed as:
Cost analysis	Costs

In public health economic evaluation, costs are determined by a method called “cost analysis.” Cost analysis forms the basis of all public health economic evaluation.

## **Cost Analysis Forms the Basis for All Studies**

- ❑ **Systematic collection**
- ❑ **Categorization**
- ❑ **Analysis of intervention/program costs**
- ❑ **But whose costs are counted?**

Cost analysis is the systematic collection, categorization, and analysis of the costs of a program or disease. In public health, “costs” is usually determined from the perspective of society as a whole.

## **Societal Perspective**

- ❑ **We're all members of society, no matter who incurs costs and who receives benefits.**
- ❑ **Societal perspective looks to improve health and well-being of society as a whole.**

The recommendation to take a societal perspective recognizes that public health seeks to improve the health and well-being of the whole population. However, you may see cost analyses from other perspectives such as the perspective of a government entity or an employer. On the next few slides, we will walk through a health care example.

### Example: How Perspective Influences Which Costs Are Counted in a Cost Analysis

<u>Cost</u>	<u>Perspective</u>			
	<u>Societal</u>	<u>Insurer/ Payer</u>	<u>Employer</u>	<u>Patient/ Client</u>
<b>Direct medical</b>	Yes	Yes	Yes	Yes

Across the top of this table are four perspectives. The first is the societal perspective meaning all of society as a whole regardless who pays the costs. The second column shows an insurer/payer perspective, for example the costs that would be incurred or saved by an insurance company or Medicare. The third column shows the perspective of an employer, and the fourth column represents the perspective of the client or patient.

In the first row are medical costs—these would be costs such as clinical services, hospitalization, and medications. You can see from the chart that these costs would be counted no matter which perspective was used in a study.

### Example: How Perspective Influences Which Costs Are Counted in a Cost Analysis

<u>Cost</u>	<u>Perspective</u>			
	<u>Societal</u>	<u>Insurer/ Payer</u>	<u>Employer</u>	<u>Patient/ Client</u>
<b>Direct medical</b>	Yes	Yes	Yes	Yes
<b>Direct non-medical (e.g., transportation, day care)</b>	Yes	No	No	Yes

In the second row are non-medical costs such as transportation or child care expenses incurred because of an illness or disability. Because a health insurance company or an employer would not pay for such costs, they would not be counted as costs in a study that took those perspectives. Using a societal perspective ensures that these costs are counted.

### Example: How Perspective Influences Which Costs Are Counted in a Cost Analysis

<u>Cost</u>	<u>Perspective</u>			
	<u>Societal</u>	<u>Insurer/ Payer</u>	<u>Employer</u>	<u>Patient/ Client</u>
<b>Direct medical</b>	Yes	Yes	Yes	Yes
<b>Direct non-medical (e.g., transportation, day care)</b>	Yes	No	No	Yes
<b>Indirect (e.g., time lost from work)</b>	Yes	No	Yes	Yes

Indirect costs, shown in the third row, include time lost from work. Such costs would not be included in a study from the perspective of the insurer. An employee's lost time from work would, however, be counted as a cost to the employer whose workforce is impacted, the patient who misses work, and again, to society in terms of the productivity of that employee that is lost.

### Example: How Perspective Influences Which Costs Are Counted in a Cost Analysis

<u>Cost</u>	<u>Perspective</u>			
	<u>Societal</u>	<u>Insurer/ Payer</u>	<u>Employer</u>	<u>Patient/ Client</u>
<b>Direct medical</b>	Yes	Yes	Yes	Yes
<b>Direct non-medical (e.g., transportation, day care)</b>	Yes	No	No	Yes
<b>Indirect (e.g., time lost from work)</b>	Yes	No	Yes	Yes
<b>Intangible (e.g., pain and suffering)</b>	Yes	No	No	Yes

In the last row are intangible costs such as pain and suffering. Although these are often difficult to measure, they represent a cost to the patient and a cost to society, often in terms of quality of life.

The important point to understand from this chart is that the perspective taken in an economic analysis can have an important influence in how an intervention is assessed and the results obtained and interpreted.



### **Key Points on Study Perspective**

- ❑ **Perspective influences the study results.**
- ❑ **For public health studies, a societal perspective is recommended.**
- ❑ **Take note when costs are merely shifted, not really saved.**

An insurer may be looking to reduce its expenditures for direct medical costs and in the process may simply shift costs from itself to someone else. For example, outpatient surgery may reduce the medical expenses for a procedure by reducing in-hospital care. However, the costs of patient care do not disappear—they are simply shifted from the insurer to the patient, for example when a patient's family member must take time off from work or leisure activities to provide home care.

## Other Perspectives

- ❑ **Cost analysis of a program may be needed to simply describe what it costs to implement an intervention.**
- ❑ **Sometimes another perspective still helps to advance public health goals by demonstrating good value.**

Although a societal perspective is the recommended option for public health economic analyses, it can sometimes be appropriate and helpful to measure and describe costs from other perspectives. One example is when a program conducts a cost analysis to describe in detail what it costs to implement a program.

Return on investment calculations in public health also make sense when demonstrating the value of providing health-promoting services. For example, Medicare might analyze the value of providing screening for colon cancer and you might see ROI stated something like this: "For every \$1 spent on colonoscopy, a \$2 return in investment can be expected." The higher return on investment is a savings to a particular entity like Medicare that avoids costs of treating advanced cancer, but remember that if the calculation takes only the insurer's perspective, it would not take into consideration the time and discomfort of a patient undergoing the screening, nor the time missed from work to prepare and undergo a colonoscopy.

## Cost Effectiveness Analysis

- ❑ **Cost—from cost analysis**
- ❑ **Effectiveness—from evaluation and scientific studies**
- ❑ **Outcomes in terms of health condition**
- ❑ **Cost effectiveness ratio**
  - E.g., cost per patient screened

So far we have discussed cost analysis and return on investment. Let us turn to three types of economic evaluation commonly used in public health, starting with **cost effectiveness analysis**. Remember that the basis for any economic analysis is a cost analysis. So the “cost” part of a cost effectiveness analysis would come from a cost analysis. The “effectiveness” part of the analysis would come from program evaluation or scientific studies that documented the health outcomes associated with an intervention.

## Types of Economic Evaluation Methods

Type of Economic Analysis	Results Are Expressed as:
Cost Analysis	Costs
Cost Effectiveness Analysis	Cost per unit of health or behavioral outcome improved or impacted

Then, analyzed together, cost effectiveness is expressed as a ratio of costs to effectiveness. Effectiveness is expressed in ways that are meaningful for the health condition, usually in terms of health or behavioral outcomes. In order to compare alternative strategies intended to address the same health outcome, the cost effectiveness ratio for each alternative strategy would be expressed in similar terms, for example: cost per patient screened, or cost per patient achieving blood pressure of 120/80.

Cost effectiveness analysis enables comparisons among interventions that are intended to achieve similar outcomes. But how would you compare interventions that occur in two different sectors of the economy or different diseases? For example, government decision makers might need a way to compare a program to improve emergency response to 9-1-1 calls for stroke with a program to reduce air pollution.

## Cost Benefit Analysis

- ❑ **Used to compare interventions with different outcomes**
- ❑ **All costs and all benefits converted to dollars**
- ❑ **Benefits and harms considered**
- ❑ **Discounting used to adjust to present value**
- ❑ **Benefit/cost ratio > 1 = good value**

In this case, a **cost benefit analysis** is an appropriate type of economic analysis that can make comparisons among interventions that have different outcomes, including outcomes from two different sectors of the economy.

Again, the cost part of any economic analysis comes from a cost analysis. In cost benefit analyses, costs are compared to all of the consequences (that can include both benefits and harms) and expressed in dollar terms. You will recall that in CEA, costs were compared to health outcomes. But in CBA, everything—all costs and all benefits and harms—are expressed in terms of monetary units. The dollar terms are then adjusted to their current or present value through a method called discounting. Discounting allows an analysis to take into consideration costs and benefits that happen over time, such as childhood obesity prevention programs intended to have long term impacts on preventing heart attack, stroke and diabetes.

## Types of Economic Evaluation Methods

Type of Economic Analysis	Results Are Expressed as:
Cost Analysis	Costs
Cost Effectiveness Analysis	Cost per unit of health or behavioral outcome improved or impacted
Cost Benefit Analysis	Benefit cost ratio (benefits expressed as dollars divided by costs expressed as dollars)

The most common summary measure for CBA is benefit cost ratio—benefits divided by costs—and a ratio of greater than one means that the benefits outweigh the costs and the program is considered to provide good economic value.

## Cost Utility Analysis

- ❑ A type of cost effectiveness analysis
- ❑ Outcomes expressed as quality-adjusted life years (QALYs)
- ❑ Reflects morbidity and mortality
- ❑ Based on people's preferences
- ❑ Expressed as cost/QALY saved

The last type of economic analysis I'll discuss is **cost utility analysis**. CUA is a special type of cost effectiveness analysis. You will recall that in cost effectiveness analysis, outcomes are expressed as measures of health improvement such as cost per patient whose blood pressure was brought under control. In cost utility analysis, the cost of an intervention is assessed with a particular measure of health improvement, the quality-adjusted life year.

The advantage over the CBA is that CUA allows a direct comparison of health-related outcomes for different types of health interventions. For example, CUA can be used to compare a program to reduce disability from stroke, a program to improve highway safety, and a prenatal nutrition program. All of these programs have public health consequences, and all of them have consequences related to disability. CUA allows comparisons to be made across different strategies by expressing outcomes in a common metric: a quality-adjusted life year.

For a CUA, the cost component again comes from a cost analysis. The QALY takes into account measures of both morbidity and mortality. Where do QALYs come from? Economic research is conducted to understand people's preferences for different states of health and disability, often using a numeric scale. For example, a person may rate one year lived in perfect health as 1.0 QALY whereas a year spent living with a serious illness may be rated only 0.6 QALY. Results of CUAs are typically expressed as cost/QALY saved.

## Types of Economic Evaluation Methods

Type of Economic Analysis	Results Are Expressed as:
Cost Analysis	Costs
Cost Effectiveness Analysis	Cost per unit of health or behavioral outcome improved or impacted
Cost Benefit Analysis	Benefit cost ratio (benefits expressed as dollars divided by costs expressed as dollars)
Cost Utility Analysis	Cost per quality-adjusted life year gained

Here is a summary table with four types of economic evaluation commonly used in public health.

- Cost analysis is the foundation of all economic studies.
- Cost effectiveness analysis uses a health or behavior outcome measure.
- Cost benefit analysis converts all benefits and harms to dollars.
- Cost utility analysis converts benefits and harms to QALYs.



## Summary and Key Points

- ❑ **Economic evaluation can aid decision making and support a good return on society's investment in public health.**
- ❑ **Return on investment calculations should be interpreted carefully.**
- ❑ **The recommended perspective for public health economic evaluation studies is a societal perspective.**
- ❑ **Other perspectives can be used to demonstrate value in supporting public health goals.**
- ❑ **Economic evaluation methods allow comparisons among different interventions, either for similar health outcomes or across outcomes from different sectors of the economy.**

Here is a summary of key points:

- Economic evaluation can aid decision making and support a good return on society's investment in public health.
- Return on investment calculations should be interpreted carefully.
- The recommended perspective for public health economic evaluation studies is a societal perspective.
- Other perspectives can be used to demonstrate value in supporting public health goals.
- Economic evaluation methods allow comparisons among different interventions, either for similar health outcomes or across outcomes from different sectors of the economy.

## Resources for Self-Study

- ❑ **Heart Disease and Stroke: 5 Podcasts on Economic Evaluation**
  - [www.cdc.gov/dhdsp/programs/nhdsp\\_program/economic\\_evaluation/index.htm](http://www.cdc.gov/dhdsp/programs/nhdsp_program/economic_evaluation/index.htm)
- ❑ **Haddix AC, Teutsch SM, Corso PS, eds. Prevention Effectiveness: A guide to Decision Analysis and Economic Evaluation. 2nd ed. New York, NY: Oxford University; 2003.**
- ❑ **From the Community Guide library**
  - [www.thecommunityguide.org/library/Economics.pdf](http://www.thecommunityguide.org/library/Economics.pdf)
- ❑ **Self-study on economic evaluation (preparedness focus)**
  - [www.cdc.gov/owcd/EET/Preface/Preface.html](http://www.cdc.gov/owcd/EET/Preface/Preface.html)

## **Please Stay with Us**

- Q&A**
- Short evaluation poll questions**

# Thank You

**Special thanks to the CVH Council  
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their topic suggestion.**

**If you have questions, please contact:  
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