Methods for Conducting Economic Evaluation for Tobacco Control and Prevention

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Disclaimer

The findings and conclusions in this presentation are those of the author and do not necessarily represent the official position of the Centers for Disease Control and Prevention.
OBJECTIVES FOR TODAY

- Demonstrate the role of economic evaluation in tobacco control and prevention
- Differentiate the types of economic methods and data and understand when each method should be used given specific evaluation questions
- Provide an overview of Return on Investment (ROI) and its relationship to other economic evaluation methods
- Illustrate examples to help you become more comfortable with concepts and terms
The Role of Economic Evaluation in Tobacco Control and Prevention
Where Economic Evaluation Fits in Public Health

Epidemiology

Etiology

Efficacy Trials

Effectiveness Trials

Dissemination

Estimate Cost of Problem to Society (COI)

Assess Cost to Deliver Program or Intervention (CA)

Assess Costs and Benefits (CEA, CBA)

Assess Payer Specific Return on Investment (ROI, BIA)

Economic Analysis

Purpose of Economic Evaluation (EE)

- Designed to inform decision making regarding both the economic costs and (health, education, environmental) consequences of various possible actions

- However, CANNOT tell you what is the “correct” choice

- Decisions involve many issues other than “bang-for-buck”
  - Equity
  - Social justice
  - Legal responsibilities
Methods for Economic Evaluation
Methods for Economic Evaluation

Partial evaluation – costs only
- Cost analysis (CA) – program costing
- Economic impact analyses or Economic burden estimates
  - Cost of illness (COI) analysis in health

Full evaluation – costs and benefits
- Cost-effectiveness analysis (CEA)
- Cost-benefit analysis (CBA)

Other Methods
- Budget Impact Analysis (BIA)
Cost Analysis (CA)

Cost analysis is an economic evaluation technique that involves the systematic collection, categorization and analysis of program costs.

- Costs are placed in different categories based on their function and characteristics
- Involves the valuation of all resources used for the program
Questions Programs Can Answer With CA

1. What are the start-up costs for the program (i.e., costs before key program activities are initiated)?

2. How much funding is expended annually by the program?

3. What is the distribution of costs among the key program activities for the program?

4. What is the average cost per person served by the program?
How Do We Define Costs?

- Costs are the value of all resources (people, equipment, supplies, buildings, vehicles) used for the program
  - Value implies what something is worth, whether money is exchanged or not

- Cost analysis (with origins in economics) makes a distinction between explicit and implicit costs
Explicit Costs

- Direct payment for resources required to implement the program – based on market prices

- Examples:
  - Salaries for project personnel
  - Supply costs
  - Travel expenses
  - Cost of educational materials
Implicit Costs

- Measure the value of the opportunity costs because the resource is not available for its next best use

- Examples:
  - Volunteer time
  - Donated space (e.g., from a university)

- Shadow prices used when price does not reflect the actual value of a good or no market price exists to accurately reflect the value of the good.
Sources for Measuring Costs

- Primary data collection
  - Accounting and payroll systems
  - Records
  - Questionnaires

- Published sources
Steps to Conduct a Cost Analysis

1. Define the Program
2. Determine the Study Perspective
3. Define a Time Frame and Analytic Horizon
4. Evaluate Program Costs
Consider a smoking cessation program in a free health clinic. This program primarily uses nicotine replacement to aid patients who express a desire to quit smoking. The patients are referred from health care providers and are seen on a monthly basis in the health clinic to receive medication, clinical monitoring and counseling.
Example Program:

Consider a smoking cessation program in a free health clinic. This program primary uses nicotine replacement to aid patients who express a desire to quit smoking. The patients are referred from health care providers and are seen on a monthly basis in the health clinic to receive medication, clinical monitoring and counseling.

1. Defining the Program

- What is the nature of the program?
- What is the target population?
- What is the delivery site?
- Who are the people delivering the program?
- What types of equipment are needed?
- What are the requirements from program participants?
1. Defining the Program...answers

- What is the nature of the program?
  - Smoking cessation via pharmacotherapy

- Who is the target population?
  - Smokers referred by their health care providers

- What is the delivery site?
  - Free health clinic

- Who are the people delivering the program?
  - Nurses, Counselors, and/or physicians

- What types of equipment are needed?
  - Medication, laboratory tests and other supplies for clinical monitoring, other supplies specific to the clinic

- What are the requirements from program participants?
  - Time, transportation
2. Determine the Study Perspective

- Provider
- Payer
- Patient
- Government
- Societal
Example Program:

Consider a smoking cessation program in a free health clinic. This program primary uses nicotine replacement to aid patients who express a desire to quit smoking. The patients are referred from health care providers and are seen on a monthly basis in the health clinic to receive medication, clinical monitoring and counseling.

Study Perspectives:

- Provider
- Payer
- Patient
- Government
- Societal

What costs would be included with each perspective?
What costs would be included with each perspective?...answers

- Provider or institution
  - Physician/nurse salary, physician/nurse time, medical supplies (lab equipment and medication), administrative staff salaries and time

- Payer
  - No public or private insurers involved in this example, but govt. may be the payer since it’s a free health clinic

- Patient
  - Patient time (time for travel, wait time in clinic, etc.)

- Government
  - Who pays for the free clinic? State Govt., Federal Govt.?

- Societal
  - All
3. Define a Time Frame and Analytic Horizon

- **Time Frame**: The period of time during which the program or intervention is delivered.

- **Analytic Horizon**: The time period used for measuring the costs (and benefits).

![Diagram showing the relationship between Time Frame and Analytic Horizon]

- Time Frame: 1/01/14 to 12/31/14
- Analytic Horizon: 12/31/14 to 12/31/16
4. Evaluate Program Costs

- Create a cost inventory
  - Classify costs
    - By line item
    - By activity
    - By funding source
  - Measure quantities of each resource used and assign a monetary value to resources (micro-costing method)
  - Discount when necessary
### WORKSHEET FOR ESTIMATING PERSONNEL COSTS - CLINIC A

<table>
<thead>
<tr>
<th>Type of Personnel</th>
<th>Number (A)</th>
<th>Average Annual Salary/Earnings (including benefits) (B)</th>
<th>% Time Spent on Activity (C)</th>
<th>Annual Cost of Personnel, in $ (A)x (B)x (C)</th>
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</thead>
<tbody>
<tr>
<td><strong>Salaried (List Position and associated degrees/licenses)</strong></td>
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<tr>
<td>Ex. Senior Nurse, RN</td>
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<td>$80,000.00</td>
<td>50.00%</td>
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<td><strong>Volunteers (List Position)</strong></td>
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</table>
### WORKSHEET FOR ESTIMATING SUPPLY COSTS - Clinic A

<table>
<thead>
<tr>
<th>Supply Type</th>
<th>Amount</th>
<th>Cost per unit</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td><strong>Office Equipment and Supplies (List Separately)</strong></td>
<td></td>
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<tr>
<td>Ex. Dell Laptops</td>
<td>2</td>
<td>$1,200.00</td>
<td>$2,400.00</td>
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<td>a)</td>
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<tr>
<td><strong>Patient Printed Materials (List separately, if not included in office equipment and supplies)</strong></td>
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<tr>
<td>Ex. Printed patient instructions</td>
<td>400</td>
<td>0.25</td>
<td><strong>$100.00</strong></td>
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<td><strong>Other supplies (List separately)</strong></td>
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<tr>
<td>Ex. Postage</td>
<td>500</td>
<td>0.44</td>
<td><strong>$220.00</strong></td>
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### WORKSHEET FOR RECORDING INTERVENTION COSTS BY RESOURCE CATEGORY

<table>
<thead>
<tr>
<th>Resource Category</th>
<th>(Annual $ value) Donated/In-kind Contributions</th>
<th>(Annual $) Actual Expenditures</th>
<th>Time Spent (% of Time on Training)</th>
<th>Total</th>
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<tbody>
<tr>
<td>START-UP COSTS</td>
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<tr>
<td>Equipment (List Separately)</td>
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<tr>
<td>Building/Office Space</td>
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<tr>
<td>Training (Initial)</td>
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<tr>
<td>Time/expense for establishing program (setting up partnerships, etc.)</td>
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<tr>
<td>Other start-up costs (List Separately)</td>
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<p>| OPERATIONS COSTS |                                               |                               |                                   |       |
| Personnel (Calculated from personnel costs worksheet) | Automatically Calculated From Personnel Worksheet | $0.00 |
| Supplies (Calculated from supplies worksheet) | Automatically Calculated From Supply Worksheet | $0.00 |
| Buildings (Operation and Maintenance) | N/A | $0.00 |
| Training (Recurrent) | | $0.00 |
| Other Operating Inputs | | $0.00 |
| Subtotal          |                                               |                               |                                   | $0.00 |
| TOTAL             |                                               |                               |                                   | $0.00 |</p>
<table>
<thead>
<tr>
<th>Donated Resources (List Separately)</th>
<th>Approach to Determining Value</th>
<th>Value</th>
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<tbody>
<tr>
<td>Materials</td>
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<tr>
<td>Ex. 5 HP Desktop computers</td>
<td>Market value @ $400 each</td>
<td>$2,000.00</td>
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<tr>
<td>Time</td>
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<tr>
<td>Ex. Student intern @ 240 hours</td>
<td>Wage rate (based on age, gender, education, and years of experience)</td>
<td>$16,000</td>
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Summary of Cost Analysis (CA)

- Cost analysis is the first step in economic evaluation.
- Cost analysis involves the valuation of all resources used for the program.
- The perspective of the study helps to determine which costs to include.
- A cost inventory is important to help organize costs.
CA Tools and References

State Tobacco Prevention Programs:
- CDC, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health. STATE (State Tobacco Activities Tracking & Evaluation System). Available at: http://www.cdc.gov/statesystem

Cost Analysis Example in Cancer Prevention:
Cost of Illness (COI) Analysis

Cost-of-illness analysis measures the economic burden of a disease and estimates the maximum amount that could potentially be saved or gained if a disease were to be eradicated.

- Not just illness; also injury, disability, or risk factors (e.g. cigarette smoking)
Questions Programs Can Answer With COI

1. What is the economic burden of this disease/condition on society?
   — What is the burden in my state?
   — What direct and indirect costs result from premature death, disability, and injury due to this disease/condition?

2. What are the potential benefits of a health care intervention if it can eradicate this disease/condition?
Categories of Costs in COI

- **Direct costs**
  - Medical and non-medical costs associated with the diagnosis, treatment, and rehabilitation associated with the disease or condition

- **Indirect or productivity costs**
  - Lost economic productivity of an affected person due to morbidity or mortality
  - Not to be confused with indirect or overhead accounting costs

- **Intangible costs**
  - Pain and suffering
  - Usually excluded from cost analyses
### Cost Included in COI Analysis by Perspective

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Direct Costs</th>
<th>Indirect Costs</th>
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<tbody>
<tr>
<td></td>
<td>Medical</td>
<td>Non-Medical</td>
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<tr>
<td>Payer</td>
<td>Covered Costs</td>
<td>—</td>
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<tr>
<td>Patient</td>
<td>Out of pocket costs</td>
<td>Out of pocket costs</td>
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<tr>
<td>Businesses</td>
<td>Covered costs (self-insured)</td>
<td>—</td>
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<tr>
<td>Government</td>
<td>Covered (Medicare, Medicaid)</td>
<td>Criminal justice costs</td>
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<tr>
<td>Societal</td>
<td>All Costs</td>
<td>All Costs</td>
</tr>
</tbody>
</table>

Ways to Get Direct Costs

- **Directly**
  - Micro-costing
    - Calculate quantities of labor time, equipment, supplies, etc.
    - Apply unit costs to calculate total costs

- **Indirectly (used for clinical services)**
  - Charges
    - Hospital charges (may be 2-5 times higher than actual cost.)
    - Cost-to-charge ratios can be used to estimate average cost (costs may be underestimated because of exclusion of professional fees.)
  - Fee schedule – Medicare or state-specific Medicaid
  - Average payment– claims data
Cost Estimation Approaches

- **Treatment approach**
  - Estimate expenditures associated with condition-specific tests, procedures, and drugs
    - Empirical approach – classify services used as disease-related or not
      - Excludes costs of complications and sequelae

- **Net cost approach**
  - Difference in average expenditures
  - May overstate costs because no control for confounding

- **Regression approach**
  - Statistical analysis in which diagnoses are included along with other predictors of expenditures
  - This controls for presence of other chronic disease and risk factors
Ways to Get Indirect Costs

- **Long-term disability and death**
  - Gross human capital approach is standard in US
    - Calculate individual output as gross earnings, including benefits and payroll taxes
    - Value of household work as the opportunity cost of hiring a replacement from the labor market
  - Net human capital approach used by forensic economists
    - Subtract value of personal consumption from earnings to estimate external loss to rest of society

- **Short-term disability easy to assess**
  - Loss of work days times daily earnings
Prevalence and Incidence-based Cost Estimates

- **Prevalence-based COI estimates**
  - How much do we spend in one year to take care of individuals with condition X?
  - Lost productivity from prevalent cases (disability) and deaths in current year due to previous exposures
  - Cannot be used to predict cost savings through prevention

- **Incidence-based COI estimates**
  - Calculate present value of lifetime costs of a newly incident case
  - Can be used as input in cost-effectiveness analysis to predict averted costs from prevention

- **Hybrid analyses**
  - Current year direct costs and present value of indirect costs
Incremental Per-Patient Costs

- Economic calculation requires incremental cost – counterfactual to estimate benefit of prevention
  - Simplest approach is to subtract mean costs of care for affected persons from demographically similar persons without disease
  - Important to control for comorbid conditions
  - Usually impossible to control for lifestyle, environmental, and genetic factors
Discounting Costs

- Discounting adjusts future costs and outcomes to their present value.

- Discounting allows us to calculate the present value of costs that occur in the future.

- Discounting is relevant in COI due to direct and indirect costs that may accrue past the first year.

- Standard is 3% in COI studies.
Reporting of Cost Estimates

- **Median cost**
  - Cost for “typical” affected person
  - Per person cost per year
  - Can also include interquartile range

- **Mean or average cost** *(required for aggregate estimates)*
  - Number of affected persons times mean cost is total aggregate cost to society
  - Can also report 95\textsuperscript{th} percentile
Sources of Health Care Cost Data

- **National Surveys/Administrative Data**
  - Medical Expenditure Panel Survey (MEPS)
  - Medicare Current Beneficiary Survey (MCBS)
  - National Hospital Ambulatory Medical Care Survey (NHAMCS)
  - National Ambulatory Medical Care Survey (NAMCS)
  - Health Care Utilization Project (HCUP)

- **Claims Data**
  - Public – Medicare and Medicaid
  - Proprietary
    - MarketScan (Truvan Health Analytics, Inc.)
    - Health Care Cost Institute (HCCI), non-profit – multiple insurers
    - State All Payers Claims Databases
CDC Health Care Data Sources

- **OSH Surveys**
  - National Youth Tobacco Survey (NYTS)
  - National Adult Tobacco Survey (2009-2014)
  - Global Tobacco Surveillance System
    - Global Adult Tobacco Survey (GATS)
    - Global Youth Tobacco Survey (GYTS)

- **Other CDC surveys leveraged**
  - National Health Interview Survey (NHIS)
  - National Health and Nutrition Examination Survey (NHANES)
  - Behavioral Risk Factor Surveillance System (BRFSS)
  - Youth Risk Behavior Survey (YRBS)
Health Care Data Sources: Pros

- Hospital discharge data
  - Covers all payers, representative of population

- Claims data
  - Very large numbers of observations
  - Actual expenditures, not prices
  - Detailed data on procedures, drugs, etc.
Health Care Data Sources: Cons

- **Hospital discharge data**
  - Hospital charges are crude, even with cost-to-charge ratios
  - Excludes professional fees (~20% of hospital costs on average)
  - Hospital costs are small minority of all health care costs

- **Claims data**
  - Not representative of total population

- **Survey data**
  - Useful for common, chronic conditions, not for uncommon ones
Summary of Cost-of-Illness (COI) Analysis

- A comprehensive cost-of-illness study includes both direct and indirect costs to estimate total costs incurred because of a disease or condition.

- The societal perspective is the most comprehensive.

- If the costs extend past one year, incidence-based estimates provide information about the cost of averting a case, whereas prevalence-based estimates provide a snapshot of current costs.

- COI can aid in cost-effectiveness analysis and cost-benefit analysis by providing the baseline costs of an illness without an intervention.

- A 3-percent discount rate is recommended.
COI Tools and References

Cost-effectiveness Analysis (CEA)

- Estimates incremental costs and outcomes of interventions
- Compares results from one or multiple interventions with other interventions (or no intervention) affecting the same outcome
- Expresses outcomes in natural health units
  - Number of cases prevented
  - Number of lives saved
Questions Programs Can Answer With CEA

1. Which of a number of alternative interventions represent the best value for the money?
   — What is the most cost-effective strategy, from various interventions, to reduce tobacco consumption?

2. What strategies/interventions are dominated by other strategies/interventions?
Measures for Cost-Effectiveness Analysis

Cost-Effectiveness Ratio (CER) = \( \text{Total Cost (C)} \) 
\[
\frac{\text{Units of Effectiveness (E)}}{
}

Incremental cost-effectiveness ratio (ICER)

\[
\Delta C = \text{Cost new treatment – cost current treatment} \\
\Delta E = \text{Effect new treatment – effect current treatment}
\]
## Example of CEA Ratios

### Smoking Cessation Intervention

<table>
<thead>
<tr>
<th>Program</th>
<th>Costs</th>
<th>Effects</th>
<th>C/E</th>
<th>ΔC/ΔE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>110</td>
<td>20</td>
<td>110/20 = 5.50</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>120</td>
<td>29</td>
<td>120/29 = 4.14</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>150</td>
<td>50</td>
<td>150/50 = 3.00</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>190</td>
<td>60</td>
<td>190/60 = 3.17</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>240</td>
<td>70</td>
<td>240/70 = 3.43</td>
<td></td>
</tr>
</tbody>
</table>

Average Cost-Effectiveness Ratio = \( \frac{\text{Cost (C)}}{\text{Units of Effectiveness (E)}} \)

Exercises adapted from CEA workshop conducted by Quynh Do for Alabama Department of Health, 2015 Econ Aid Project
## Example of CEA Ratios

### Smoking Cessation Intervention

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<td>240</td>
<td>70</td>
<td>3.43</td>
<td>5.00</td>
</tr>
</tbody>
</table>

ICER = \( \frac{\text{Difference in Cost}}{\text{Difference in Effectiveness}} = \frac{\Delta C}{\Delta E} = \frac{\text{Cost new treatment} - \text{cost current treatment}}{\text{Effect new treatment} - \text{effect current treatment}} \)

Exercises adapted from CEA workshop conducted by Quynh Do for Alabama Department of Health, 2015 Econ Aid Project
Incremental Cost-effectiveness Plane

- Quadrant I: New treatment more costly and more effective
- Quadrant II: New treatment dominates
- Quadrant III: New treatment less costly and less effective
- Quadrant IV: Old treatment dominates
Choosing the Right Alternative Using ICER

ICER = \[
\frac{\Delta \text{ Costs}}{\Delta \text{ Effects}} < \lambda
\]

\[
\lambda = \text{willingness to pay}
\]
Which Treatment Makes the Grade?

A

B

C

D

E

More effective

Less effective

More costly

Less costly
CEA References

- Villanti A. Smoking Cessation Interventions for US Adults and Young Adults: Evaluating Effects and Cost-effectiveness: Johns Hopkins University; 2010.
A Complementary Tool to CEA

Budget Impact Analysis (BIA)

- A tool to understand the potential impact that implementing a prevention program will have on the payer's budget.
- Estimates the financial consequences of adopting a new intervention for local, regional, and national budgets (usually in addition to CEA)
  - New public health interventions may require an increase in public or private health care expenditures
  - New interventions may result in reduced condition costs because of reduced number or severity of cases
  - Reduced condition costs may partially or totally offset the increase in public or private health care expenditures
Budget Impact Analysis (BIA)...cont.

- BIA identifies the size of the population affected by the intervention and the effect of implementation on costs over the short-term.
- Focuses on the direct costs of specific resources needed to put the intervention into effect, such as supplies, equipment, and staff.
- Assessed from the payer's perspective, uses a short-term time horizon, does not use discounting or long-term modeling, and does not include overhead costs.
- Difficulty rests in:
  - Generalizing results (don’t)
  - Programs accessing accurate and up to date financial information
BIA References


Cost – Benefit Analysis (CBA)

- A method used to compare costs and benefits of an intervention where all the costs and benefits are standardized or valued in monetary terms.

- Used to compare different programs with different units of outcomes (health and non-health).

- Estimates full costs and benefits of interventions.

- Outcomes expressed in a single $ value (*net benefits*).

- Used for choosing across policy options.
Cost – Benefit Analysis (CBA)...cont.

- When can CBA be used?
  - In deciding whether to implement a program.
    - If NB > 0, implement.
  - When choosing among competing options.
    - Implement program with highest NB.
  - For setting priorities when budgets are limited.

- Most useful for marketing the ROI in public health.
Classifying Benefits

- **Direct benefits**
  - Expenditures saved for prevention, detection, treatment, rehab, professional services, drugs, medical supplies, etc.

- **Indirect benefits**
  - Potential increased earnings or productivity gains as a result of an intervention
  - Usually calculated as the avoidance of earnings and productivity losses (morbidity and mortality) without the intervention

- **Intangible benefits**
  - Psychological benefits of health, satisfaction of life
Quantifying Benefits

- Human Capital or Cost-of-Illness (COI) approach
  - Typically includes medical costs and productivity losses averted

- Willingness-to-Pay (WTP) or Contingent-valuation approach
  - How much is society willing to pay to reduce the annual mortality risk associated with secondary smoke?
An Example: CBA for household health

Evaluation of the costs and benefits of household energy and health interventions at global and regional levels ~ WHO, 2006

- **Costs**
  - Stove costs, costs for the distribution of cleaner fuels or improved stoves, research and development investments and accompanying educational measures

- **Direct Benefits:**
  - reduced health-related expenditures as a result of less illness
    - acute lower respiratory infections (ALRI) in children younger than 5 years,
    - chronic obstructive pulmonary disease (COPD) in adults older than 30 years, and
    - lung cancer in adults older than 30 years

- **Indirect Benefits:**
  - Productivity gains
  - Time savings due to the shorter time spent on fuel collection and cooking
  - Environmental benefits

The net benefit to society was between US$ 77 billion and US$ 139 billion per year at global level, and this range was based on high and low estimates of costs and benefits.

CBA References

What Do We Really Mean by ROI?
Defining ROI

A return on investment (ROI) measures the amount of return on an investment relative to the investment’s cost.

In public health, it is a tool to compare the costs of an intervention (i.e. investment) with its health or economic benefits (i.e. returns) in financial terms from the investor’s perspective.

Translation:
Convert benefits to dollars.
ROI Makes a Business Case for a Program

- **ROI helps answer these types of questions:**
  - What bang are we getting for our buck?
  - What is the return on spending money over time?
  - When will the investment be ‘worth it’?

- **ROI helps with communication**
  - “Show us the financial value of your program.”
  - “Is there a financial return for investing in this program?”
Perspective and Time Frame for ROI Studies

- **Perspective of analysis matters**
  - Who is the investor? (provider, patient, public health department, payers, government, society?)

- **Timeframe is shorter than for other economic evaluation methods**
  - In the range of 1-3 years
  - Other economic evaluation methods can range 10+ years
The ROI Formula

- \( ROI = \frac{\text{Return}}{\text{Investment}} \)

- or...

- \( ROI = \frac{\text{Value of the program's NET benefits}}{\text{Total program costs}} \)

Net = Benefits - Costs
Trying out the Formula

- **Example: Stock Market**
  - Buy 20 shares of stock for $10/share
  - Then sell those shares for $250

- **What’s the ROI?**

  \[
  ROI = \frac{\text{Return}}{\text{Investment}} \times 100\%
  \]

  - Investment = Cost of buying shares = 20 shares \* $10 = $200
  - Return = Benefits received from selling shares = $250 – Cost of buying shares

  \[
  ROI = \frac{250 - 200}{200} \times 100\% = 25\%
  \]
### Example: ROI in Public Health

#### Example: Asthma Educational Program

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Cost of Program per patient (Investment)</th>
<th>Emergency room cost saved per patient (Return)</th>
<th>ROI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Health Department (PHD)</td>
<td>$500</td>
<td>$0</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0/$500)</td>
</tr>
<tr>
<td>Payer (PHD pays for the program)</td>
<td>$0</td>
<td>$1,500</td>
<td>ROI can’t be calculated because there is no payer investment</td>
</tr>
<tr>
<td>State Health Programs (PHD and Medicaid)</td>
<td>$500</td>
<td>$1,500</td>
<td>200%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>($1,500 - $500) / $500 =</td>
</tr>
<tr>
<td>Payer (Payer pays for the program)</td>
<td>$500</td>
<td>$1,500</td>
<td>200%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>($1,500 - $500) / $500 =</td>
</tr>
<tr>
<td>Societal (PHD pays for the program)</td>
<td>$500</td>
<td>$1,500</td>
<td>ROI can’t be calculated without additional information on benefits</td>
</tr>
</tbody>
</table>

Source: https://www.practicalplaybook.org/page/return-investment-know-your-projects-value
Limitations of ROI in Public Health

- ROI can have multiple meanings
- The interests of investors in public health are different than those that invest to generate profits
- ROI is only one piece of information
- Might not be the right method to answer your questions
- Other economic evaluation methods can help make the “ROI-like” case
# Comparison of Methods

<table>
<thead>
<tr>
<th>Economic Evaluation Method</th>
<th>Comparison</th>
<th>Measurement of Effects</th>
<th>Economic Summary Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost Analysis</td>
<td>Used to compare costs of implementing a program/intervention</td>
<td>Dollars</td>
<td>Cost of program</td>
</tr>
<tr>
<td>Cost of Illness Analysis</td>
<td>Used to measure the economic burden of a disease</td>
<td>Dollars</td>
<td>Cost of illness</td>
</tr>
</tbody>
</table>
| Cost-Effectiveness Analysis| Used to compare interventions that produce a common health outcome | Health outcomes, measured in natural units | Incremental Cost-effectiveness ratio (ICER)  
Cost per case averted  
Cost per life-year saved |
| Cost-Benefit Analysis      | Used to compare different programs with different units of outcomes (health and non-health) | Dollars                 | Net benefit or cost  
Benefit to cost ratio |
| Budget Impact Analysis     | Used to estimate the financial consequences of adopting a new intervention for local, regional, and national budgets | Dollars                 | Annual change in resource use  
Annual change in cases of condition and associated resource use and costs |
| Return on Investment       | A financial analysis from the perspective of the investor   | Dollars                 | Net financial cost over dollars invested |
Summary

- Economic evaluation (EE) methods can be useful for informing public health policy, planning, and practice.

- Programs must understand which method is appropriate for answering the questions they are asking.
General Public Health Economics Resources

- Understanding and Using Economic Evidence, the Guide to Community Preventive Services (Chapter 11). Available at: https://www.thecommunityguide.org/sites/default/files/publications/Ch11-Economics.pdf
THANK YOU!

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.