



Methods for Health Economic Evaluation

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Introduction

Economics: The study of how people and society choose to employ scarce resources in the production and distribution of goods and services so as to best satisfy human wants.

Health Economics: Applies basic theories, concepts, and tools of economics to the problems and issues in the health care sector; attempts to determine how to use the limited amount of resources available most *efficiently* in obtaining society's desired health goals.



Efficiency considerations

- *Allocative efficiency*: Allocative efficiency is achieved in the overall economy and in the health economy when the optimal mix of goods and services is chosen given the underlying preferences of the society.
- *Production/technical efficiency*: Society is producing maximum output using its limited resources since the best mix of inputs has been used to produce output.

Decision Making Pyramid

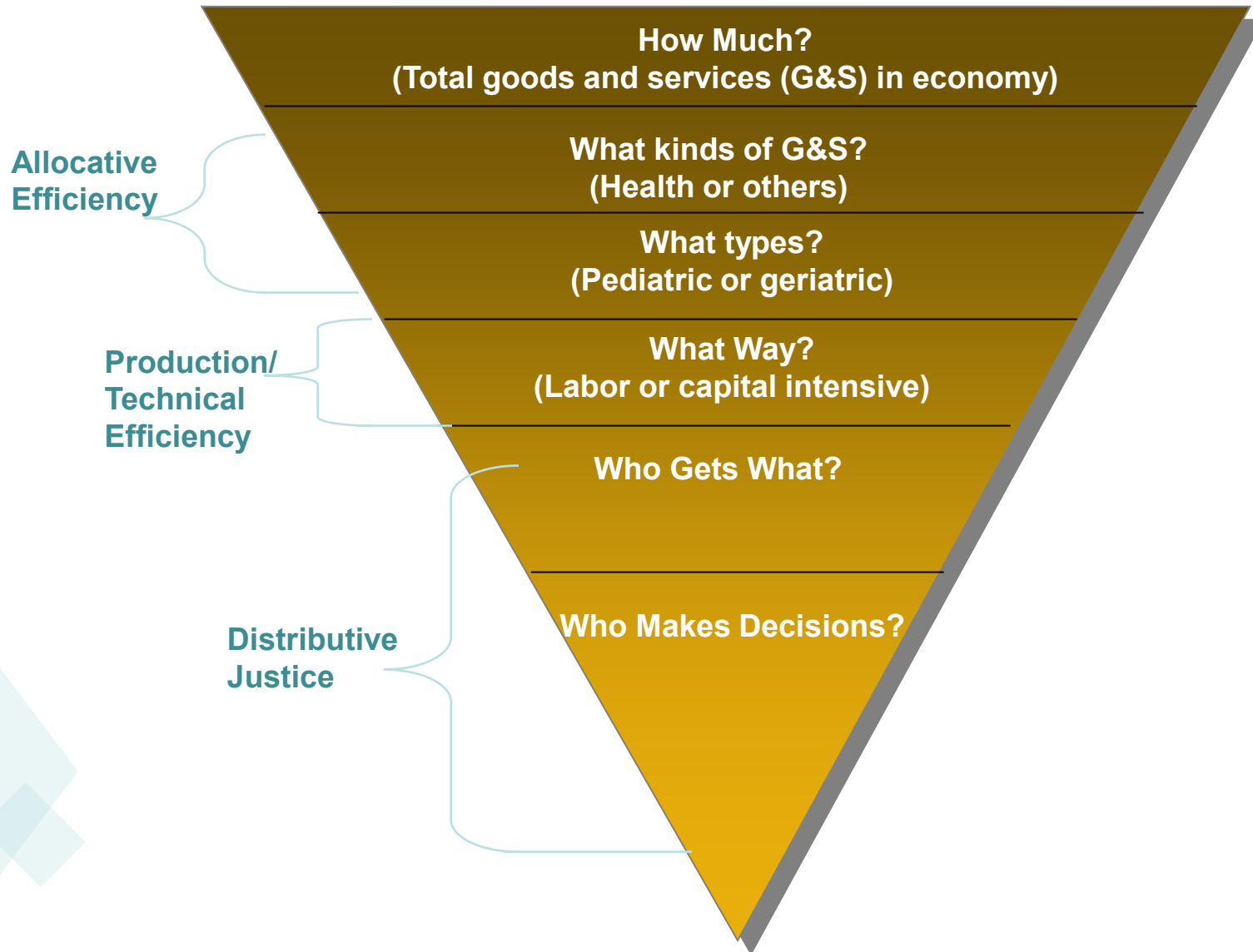
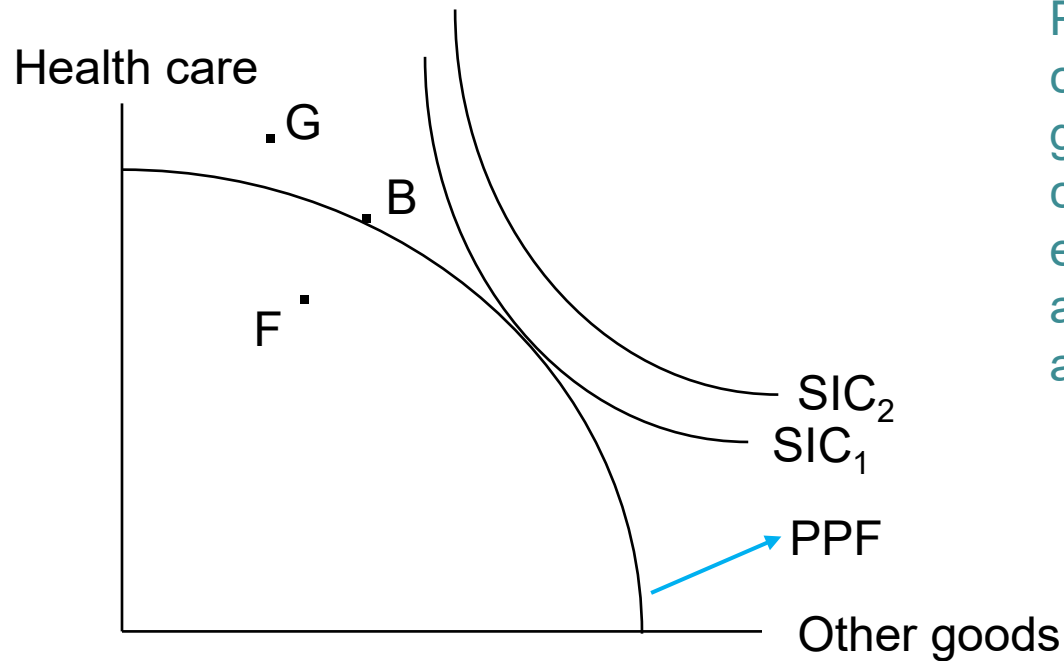


Illustration of Allocative and Production Efficiency using Production Possibilities Frontier (PPF)



PPF: Shows different combinations of two goods/services that can be produced efficiently using available resources and technology.

Shape of PPF:
Concave to the origin because of law of diminishing returns.

Production efficiency is achieved at every point on the PPF.

Every point on the PPF is a potential candidate for allocative efficiency.

Need for Economic Evaluation



- The mission of any health care system, institution, or program is to use its scarce resources to meet the health care needs of its population - no system, institution, or program has sufficient resources to do everything that might be beneficial
- Economic evaluation provides information on the impact/consequences of the intervention to assist decision makers in using their scarce resources most effectively - how to make rationing decisions



Basic Economic Evaluation

- Purpose: To compare the relative value of different interventions/programs/implementation strategies in creating better health and/or longer life in order to maximize benefits
- Definition: Economic evaluation in health is a method designed to assess the comparative impacts of expenditures on different health interventions/programs/implementation strategies



Steps in Economic Analysis

- Define problem
- State objectives
- Identify alternatives
- Construct decision tree
- Analyze benefits/effects
- Analyze costs
- Differentiate perspective of analysis
- Perform discounting
- Address ethical issues
- Discuss results
- Monitor and re-evaluate decisions



1. Define Problem

- The problem should be clearly and explicitly defined and the relationship to outcome or status should be stated; establish the boundaries of the problem
- Example: Healthy People 2020
Healthy People provides science-based, 10-year national objectives for improving the health of all Americans.
 - High mortality rate of cancer (178.4 cancer deaths per 100,000 population occurred in 2007).

High Mortality Rate in Cancer

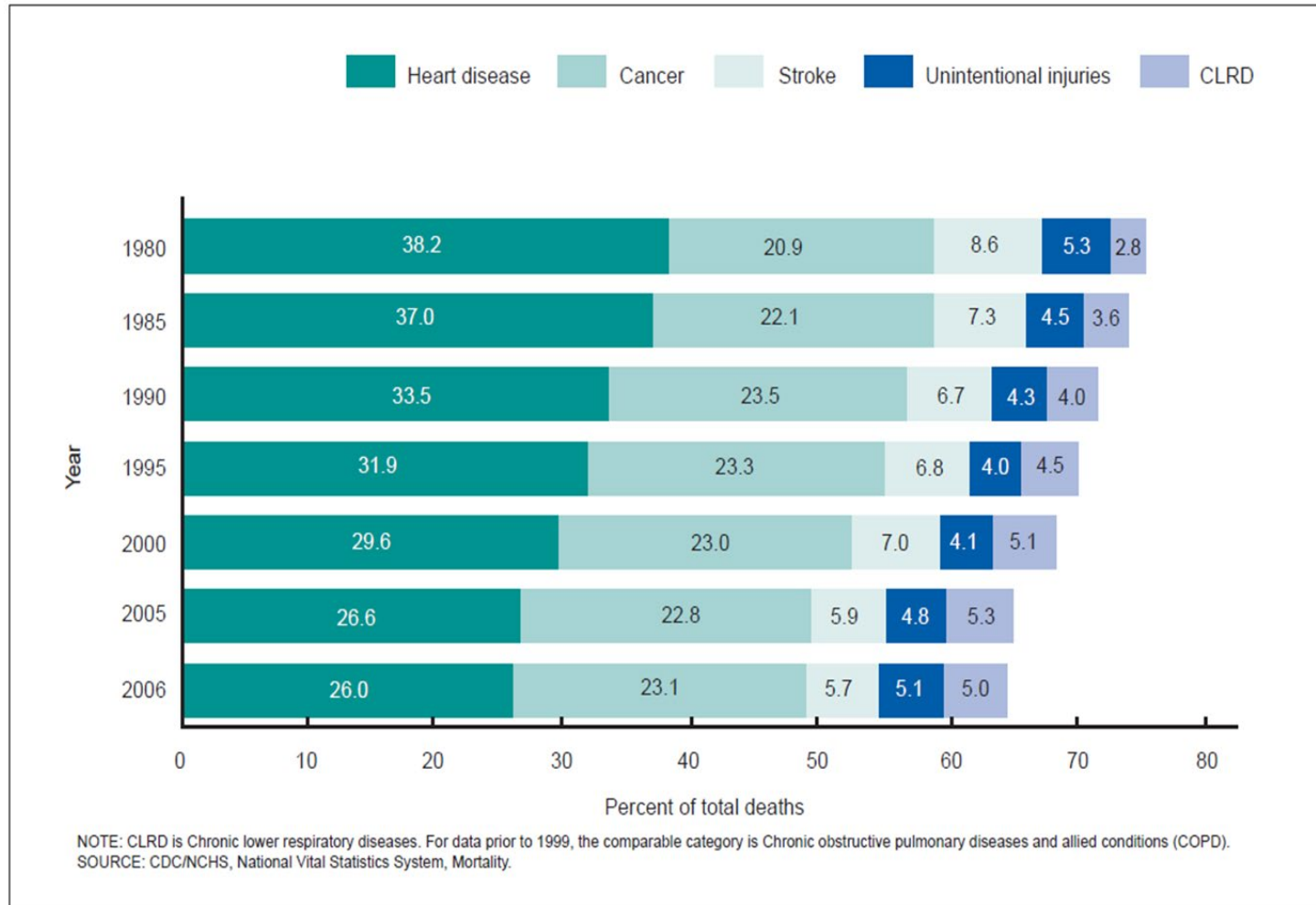


Figure 1. Percentage of total deaths for the top five causes of death among all races: United States, 1980–2006



2. State Objective

- The objectives of the problem being assessed should be explicitly stated, and the analysis should address the degree to which the objectives are expected to be met.
- Example: Healthy People 2020
10 percent improvement (160.6 deaths per 100,000 population until 2020).



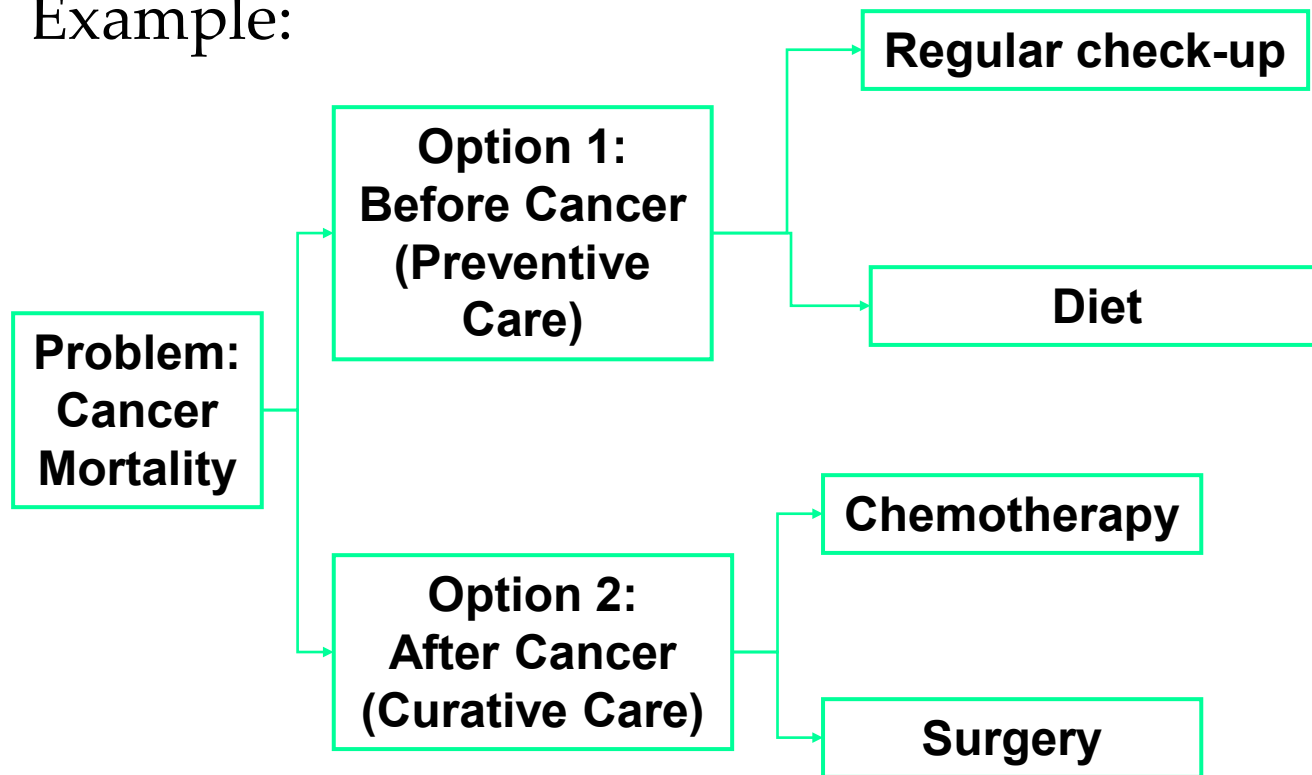
3. Identify Alternatives

- Alternative means to accomplish the objectives should be identified and subjected to analysis; what are the options?
- Example: Healthy People 2020
 - Increase the proportion of adults who were counseled about cancer screening consistent with current guidelines.
 - Increase the proportion of persons who participate in behaviors that reduce their exposure to harmful ultraviolet (UV) irradiation and avoid sunburn.



4. Construct Decision Tree

- Graphically depict alternatives available
- Example:





5. Analyze Benefits/Effects

- All foreseeable benefits/effects (positive and negative outcomes) should be identified, and when possible, should be measured; all benefits should be valued in common terms in order to make comparisons easier



5. Analyze Benefits/Effects

- Benefits of a medical intervention:
 - Medical costs diverted because an illness is prevented.
 - Monetary value of the loss in production diverted because death is postponed.
 - Monetary value of the potential loss in production avoided because good health is restored.
 - The monetary value of the loss in satisfaction or utility averted due to a continuation of life or an improvement in health (or both).



6. Analyze Costs

- All expected costs should be identified, and when possible, should be measured and valued in common terms.
- Costs:
 - Direct medical costs
 - Direct non-medical costs: all monetary costs imposed on any non-medical personnel (e.g. transportation cost)
 - Indirect costs: time costs associated with implementation of treatment (opportunity cost)



7. Differentiate Perspective of Analysis

- Identify the perspective from which the analysis is being viewed; for example, payer, provider, consumer, or society, because the 'costs' and 'benefits' may be different for each entity



8. Perform Discounting

- The value of a rupee now is greater than the value of a rupee later; therefore, people prefer to receive rupee now more than a rupee next year (time preference of money).
- Time preference of money necessitates discounting future costs and benefits; the process of discounting gives greater weight to costs and benefits the earlier they occur.



9. Address Ethical Issues

- Ethical issues should be identified, discussed, and placed in appropriate perspective relative to the rest of the analysis and the objectives of the analysis
- Example: Mercy killing



10. Discuss Results

- The results of the analysis should be discussed in terms of validity, sensitivity to changes in assumptions, and the implications for decision making



11. Re-evaluate Decisions

- After implementation, conditions should be monitored and reassessment of appropriateness of continuation of the project or program should be conducted

Types of Economic Evaluations



- Cost-Benefit Analysis
- Cost-Effectiveness Analysis
- Cost-Utility Analysis



Cost-Benefit Analysis

- ***Benefit-cost Ratio Approach:*** Projects are compared on the basis of the average benefit per unit cost; the project with the greatest ratio of benefits to costs is selected (benefits / costs) - impacted by classification of an event as a cost or a benefit
- ***Net Benefit Approach:*** Projects are compared on the basis of the excess of benefits over costs; total costs are subtracted from total benefits to determine highest difference (benefits - costs) - ignores relative magnitude of projects with use of an absolute value



Cost-Effectiveness Analysis

- Used to evaluate costs associated with different treatment alternatives to achieve a desired health goal (e.g. life-years saved)
- For example, to meet the imaging needs of the organization, an MRI scanner can be purchased, leased, contracted from an independent supplier, joint ventured in providing the service, or don't provide the service



Cost-Effectiveness Analysis

- The analyst estimates the costs associated with two or more medical treatments for a given health care objective
- The comparison is done through the calculation of an incremental cost effectiveness ratio (ICER)
- If a new medical treatment is being compared to an old treatment

$$ICER = \frac{C_{new} - C_{old}}{E_{new} - E_{old}}$$

- $C_{new (old)}$ and $E_{new (old)}$ are the cost and effectiveness of the new (old) treatment

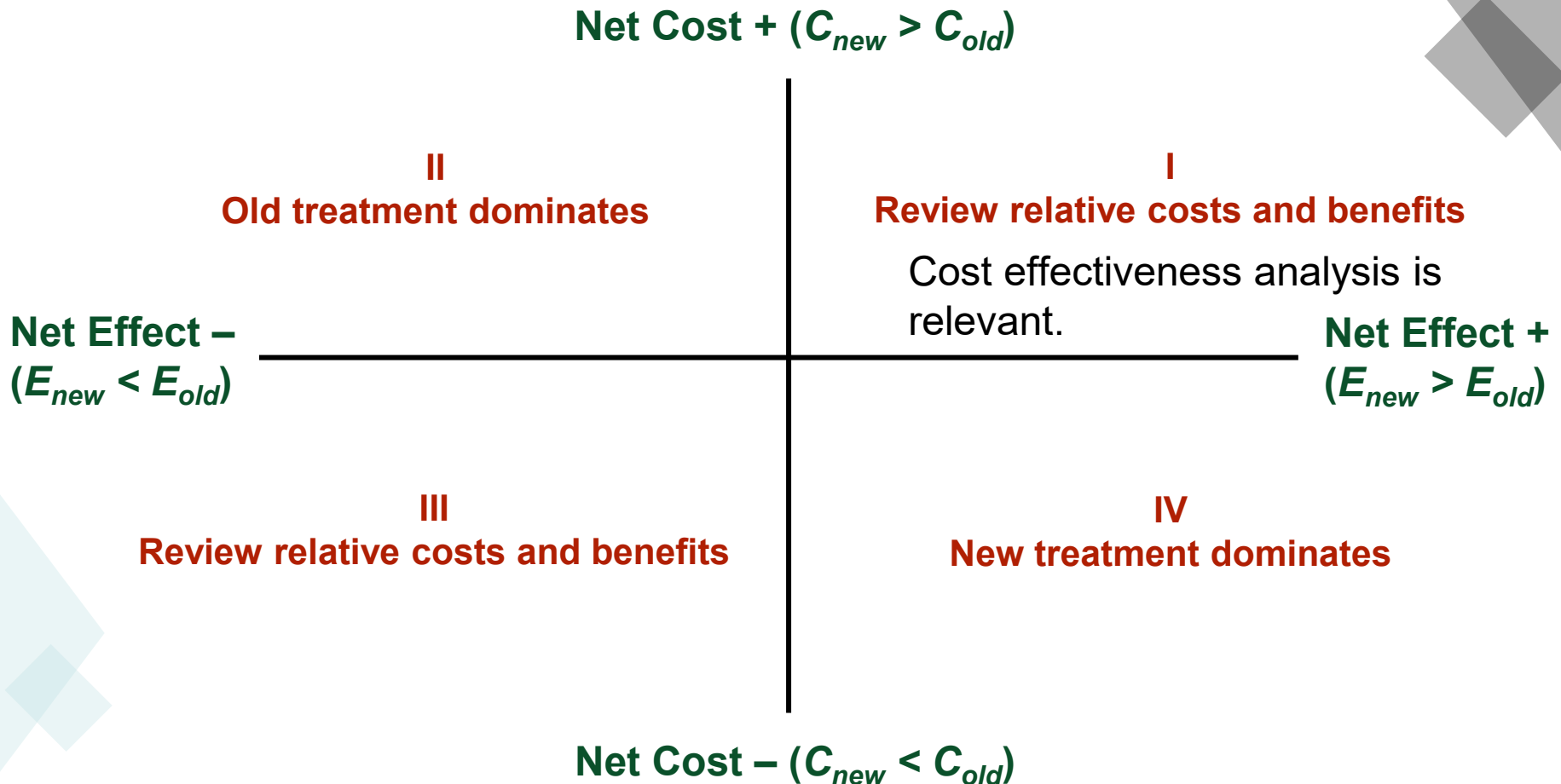


Cost-Effectiveness Plane

- The cost-effectiveness plane can be used to show how CEA can be used to determine whether a new technology or treatment should be adopted



Cost-Effectiveness Plane





Cost-Effectiveness Plane

- The most interesting case occurs in quadrant I
 - Is the gain in improved health from the new treatment worth the additional cost?
 - What is the threshold point at which a new technology or treatment is simply too costly to adopt?
 - Many agree that if the cost of a new medical treatment is less than \$50,000 per additional year of life saved it is generally viewed favorably



Cost-Utility Analysis

- Used to compare the net costs of programs that achieve the same quality outcome
- For example, coronary bypass operations do more to enhance the quality of life than do to extend life. Consider the number of life-years saved from a particular medical intervention along with the quality of life.