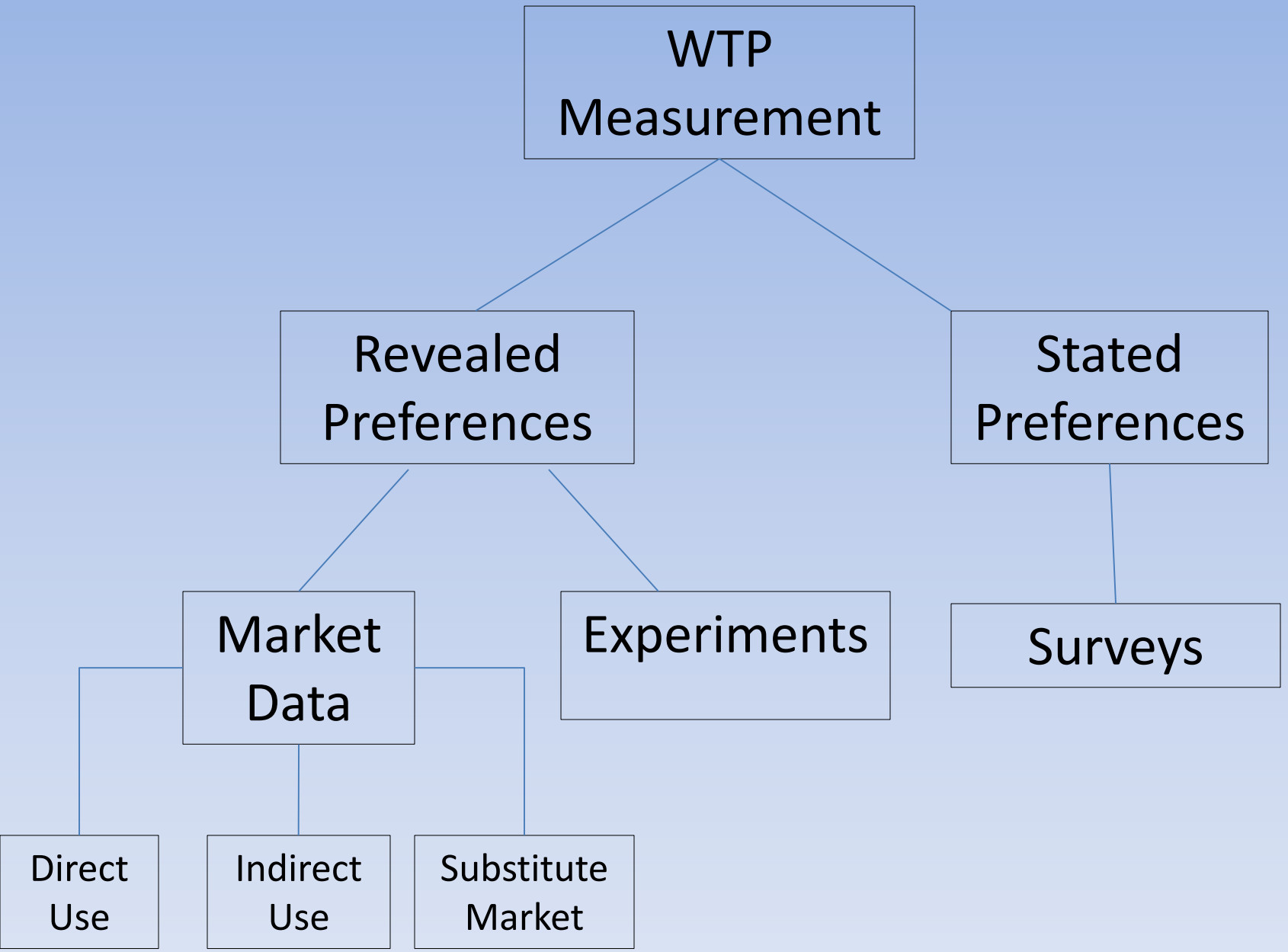
Cost Benefit Analysis Steps

1) Identify costs and benefits
2) Calculate costs and benefits
3) Compare aggregate costs and aggregate benefits


WTP Measurement
Revealed Preferences
Stated Preferences
Market Data
Experiments
Surveys
Direct Use
Indirect Use
Substitute Market

Determining Benefits of Food Label Standards

Label changes →choose healthier foods →reduced incidence of disease → deaths avoided/life-years gained

Calculating Present Value

$$\text{Actual value} / (1 + \text{discount rate})^{\#years}$$

Example: $100 2 years from now; discount rate = 3%

Present value = $\$100 / (1 + .03)^2$

= $94.26

Cost Benefit Analysis Steps

1) Identify costs and benefits
   - What counts?
   - Who counts?
   - Time period
2) Calculate costs and benefits
   - Method for calculating WTP/value
   - Methods calculating # units
   - Discounting future benefits/costs
3) Compare aggregate costs and aggregate benefits

Value of Statistical Life

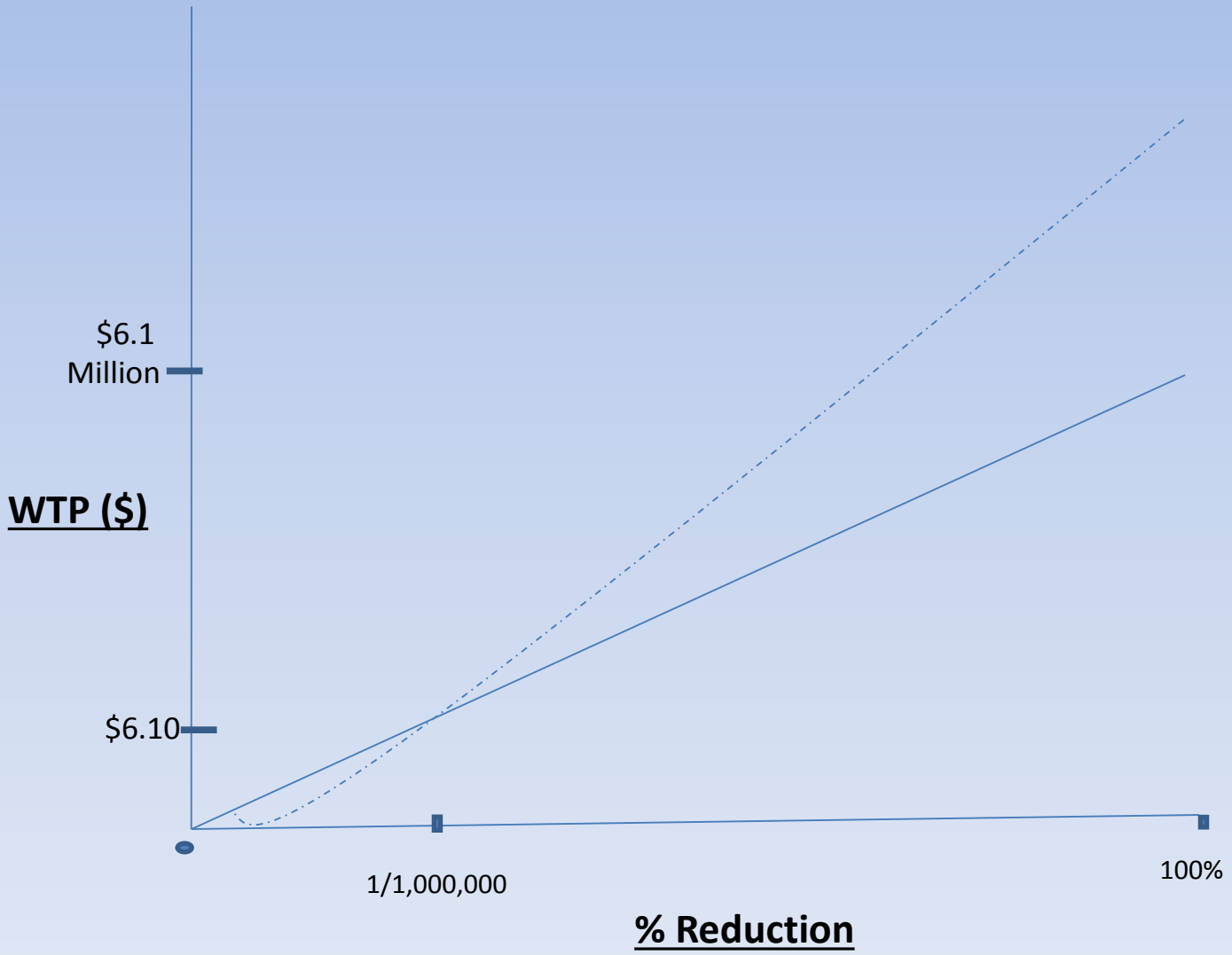
- Value 1/1 million reduction risk of death = $6.10
- "Value of Statistical Life"

  = value 1/1 million reduction risk * 1 million people

  = $6.10 * 1 million

  = $6.1 million

Value of Risk Reduction



Discounting Life/Health

$$\text{Actual value}/(1 + \text{discount rate})^{\#years}$$

Premature death avoided 20 years in the future

Value Statistical Life = $3 million

Example 1: Discount rate = 5%

Present value = $\$3{,}000{,}000/(1 + .05)^{20} = \$1{,}130{,}668$

Example 2: Discount rate = 1.5%

Present value = $\$3{,}000{,}000/(1 + .015)^{20} = \$2{,}227{,}411$

1/1 Million Risk of Death

- Air pollution from factory emissions
- Earthquake
- Job working with chemicals
- Downhill skiing

Cognitive and Other Factors Affecting Valuation of Risk

- Complete elimination of risk
- Sudden painless death vs. drawn out death with much pain and suffering
- Unfamiliar, uncertain, catastrophic risks
- Preventing new risks vs. eliminating existing risks
- Voluntarily incurred risk vs. no consent
- Man-made risk vs. acts of God
- Fairness in risk distribution
- High probability vs. low probability events

QALYs – Calculating Utility of Intervention

- *Utility of intervention* = years gained in better health state x increased utility
  - *Increased utility* = utility of health state post intervention – utility current health state
- Example:
  - Current health state: Relative utility value = .5 QALY
  - Post-intervention health state: Relative utility value = .8 QALY
  - Better health for 5 years
  - Gain = 5 years x (.8-.5, or .3 QALY) = 1.5 QALY

QALYs – Calculating Cost-Effectiveness

- Calculate cost/utility ratio

  = cost intervention/expected increase in QALYs

- Example:
  - Intervention is expected to result in 1.5 QALY gain
  - Cost = $15,000
  - Cost-utility ratio = $15,000/1.5 QALY, or $10,000 for 1 QALY gain

Using QALYs in Cost-Benefit Analysis

- *Step 1*: Estimate $$ for 1 QALY

  E.g.,

  - WTP to avoid chronic bronchitis = $260,000
  - Loss of QALY associated with chronic bronchitis = 2 QALYs
  - Value 1 QALY = $130,000 (2QALY/$260,000)

- *Step 2*: Use estimated value 1 QALY to estimate other changes in health

  – E.g.,

  - Difference between health status w/ and w/o cancer = 5 QALYs
  - Avoiding cancer = 5 QALYs = $650,000 (5 x $130,000)

How would you choose?

You have $20,000 which will fund one of the scenarios described – who would you spend the money on and why?

STEVE

18 year old Steve is a victim of a car accident. He has severe facial scarring and psychological problems as a result. Plastic surgery would correct the scarring.

JOANNE

Joanne is 42 years old and has no dependents. She has just been diagnosed as HIV positive as a result of her drug taking. She no longer takes drugs. Drug treatment is available which is 75% effective. This could extend her life expectancy and minimize symptoms. At present her symptoms are minor, but will increase over time.

ROSA

Rosa is 65 years old. She has had few health problems over her life, but now needs a hip replacement. Without the hip replacement, she will no longer be able to live alone. Her only son lives 200 miles away. The hip replacement would allow her to live independently.

DANIEL

11 year old Daniel has advanced cancer. With aggressive chemotherapy treatment he has a 20% chance of survival.