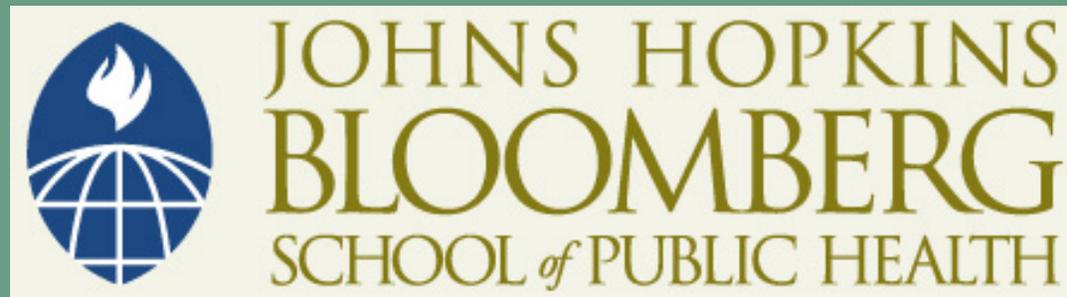


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JOHNS HOPKINS
BLOOMBERG
SCHOOL *of* PUBLIC HEALTH

Social and Ethical Value Choices

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Section A: Discounting: Valuing Future Life

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Learning Objectives

- Define *discounting*
- Demonstrate how to convert expected future earnings to their present value
- Explain the rationale for applying discounting to healthy life expected to be gained (e.g., from immunization) in the future
- Compare and contrast with the rationale for not discounting future healthy life
- Distinguish the effects of discounting future life from those of life expectation

Outline of Presentation

- Context of setting priorities in health
- Valuing health and life
- Valuing future life
 - Discounting
- Valuing life at each age
 - Age weighting
- Valuing economic and social productivity
- Valuing equity in relation to efficiency
- Discussion

Five Steps in Setting Priorities

- The Five Steps
 1. Measure impact of disease
 2. Calculate gains in healthy life for all relevant health interventions
 3. Develop unit costs for these interventions
 4. Work out optimum “benefit” /cost ratio
 5. Ensure fair distribution

- But how do we value the healthy life?

The Sixth Step

- The dollar value of healthy life—needed to compare resources used for health with their use for anything else
- Approaches
 - Productivity—average or marginal wage
 - Human capital approach—pioneered by Gunnar Myrdal
 - WTP—willingness to pay
- Jeffrey Sachs—(Commission on Macroeconomics and Health) $2X +$ per capita GNI
- Cost-effectiveness analysis— λ , the decision maker's WTP for the last intervention on the list of a league table
- Value of a statistical life—review of legislative decisions of safety regulations: \$50,000 to \$2,000,000,000 per life saved

Valuing Components

- Valuing future life as compared to present life
 - **Discounting** present value of future life
- Valuing a given duration of life
 - Life lived at different ages
 - **Age weighting**
- Valuing economic and social productivity
- Valuing equity in relation to efficiency

Discounting

- Deducting
- Offering at reduced rate
- Reducing the usual list price
- Leaving out of account; disregarding
- Taking into account in advance (so as to diminish the effect of ...)
- Advancing or lending money after deduction of interest

Discounting

- The present value (pv) of a future amount of money is the amount of money, invested now at r percent interest, that will grow to the future value at the stated time
- The *future value* $(fv) = pv \cdot (1+r)^n$
 - Where n = number of interest periods (usually years) and
 - r = interest rate
 - $pv = (fv \text{ in } n \text{ years}) / (1+r)^n$
 - Note that $1/(1+r)^n = e^{-r n}$ when continuously compounded
- It may be considered the inverse of interest rate

Discounting

- The $pv = (fv \text{ in } n \text{ years}) / (1+r)^n$
 - E.g., if the interest rate is 10%, \$100 to be received 10 years from now, has a pv of \$38.55
 - If $r = 3\%$, then $pv = \$74.41$
- Discounting is standard practice in financing/economics

Discounting

- In the use of composite measures of disease burden, expected years of healthy life in the future are commonly discounted
- Present value of a year of healthy life in the future discounted

Years hence	At 3% per year	At 8% per year
1	0.97	0.92
10	0.744	0.463
30	0.412	0.099
50	0.228	0.021

Discounting

- For example, the gains of healthy life per 1000 population per year from measles immunization in Ghana was 26.89 discounted healthy life years (given the population structure and conditions in Ghana as in the Excel spreadsheet from Ghana)
- If not discounted, the gains would be 86.99 healthy life years—a very large difference. The size of the effect depends on both the expectation of life (the future years) and on the discount rate.

The Impact of Different Discount Rates

- The impact of different discount rates on HeaLY losses in Pakistan

Disease	0%	+1%	+3%	+6%	+9%
Injuries	68.7	45.2	31.9	21.1	15.2
Childhood anemia	29.9	15.9	10.7	7.6	6.2
LTRI-child	147.0	66.0	36.8	20.7	14.4
LTRI-adult	10.5	8.3	6.8	5.1	4.0
Heart disease	37.6	28.0	21.4	15.2	11.3
Diarrhea	151.3	68.6	38.9	22.7	16.4
Total	1233.3	690.0	456.3	298.5	223.0

Factors Underlying Discounting

- The RTP—rate of time preference
 - In general, people *prefer* to have things now
- Diminishing marginal utility
 - OK for income—but what about life?
- Risk aversion
 - But uncertainty may better be dealt with separately and is not intrinsic to discounting
- Time myopia
 - An impatience to experience pleasure
 - Individual vs. society

Factors Underlying Discounting

- The RTP—rate of time preference
 - In general, people *prefer* to have things now
 - Caution: In my early efforts to explain discounting, I asked, “Would you rather have 10 years of healthy life starting now or starting 20 years from now?”
- Diminishing marginal utility
 - OK for income—but what about life?
- Risk aversion
 - But uncertainty may better be dealt with separately and is not intrinsic to discounting
- Time myopia
 - An impatience to experience pleasure
 - Individual vs. society

Issues in Discounting

- The disease eradication/health research paradox, “the only strong argument for discounting”
 - If $r = 0$ (no discount rate), future healthy life lost would be just as valuable as present healthy life lost
 - Then take resources from the present and invest them to develop prevention or cure in the future
 - Thus stop all current health care and put all such resources into better interventions for the future?
- Only discounting saves us from this logic
 - Think about this. Do you agree?

Issues in Discounting

- Club of Rome and future generations
 - Discounting: “the greatest evil ever perpetrated by economists”
- Intergenerational equity issues
- What rate of discount?
- Should life itself be discounted? Or the products of life (what that life produces)?
 - Life itself or what one does with that life?