Workshop: Policy Analysis and Decision-Making with Emphasis on Chronic Non-communicable Diseases

Bridgetown, Barbados

October 15-17, 2007

Economics and Health: An introduction to Economic Evaluation

Pan American Health Organization
Regional Office of the World Health Organization

Amparo Gordillo-Tobar. MD. PhD
Health Systems Strengthening Area
Health Policy Unit
Pan American Health Organization

Economics in Health: an introduction to Economic Evaluation

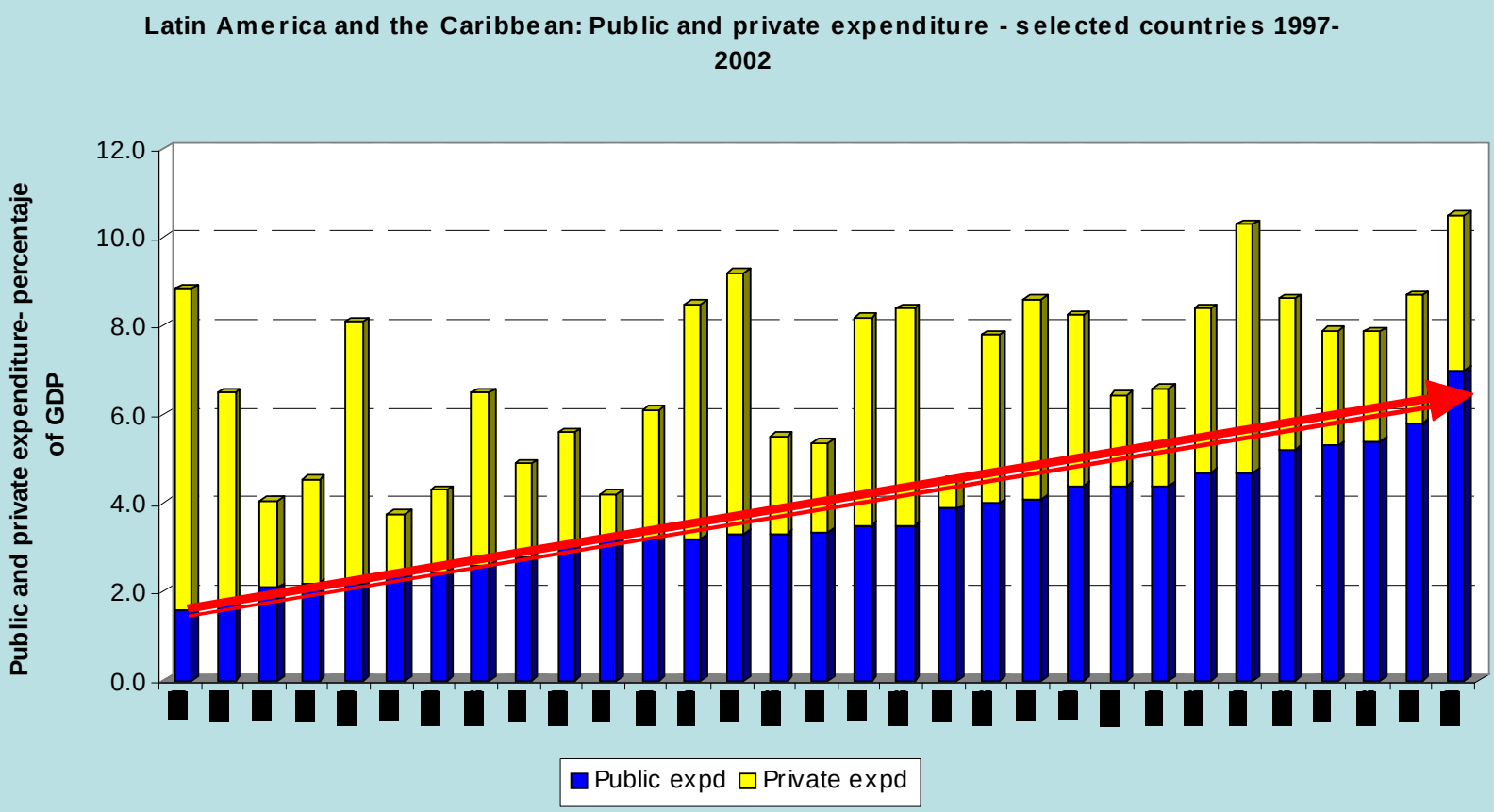
- Introduction
  - General background issues
  - Few concepts
  - Classification
    - Economic Evaluations
  - Examples
    - Cost Effectiveness
    - Economic Impact

Economic Evaluation: An Introduction

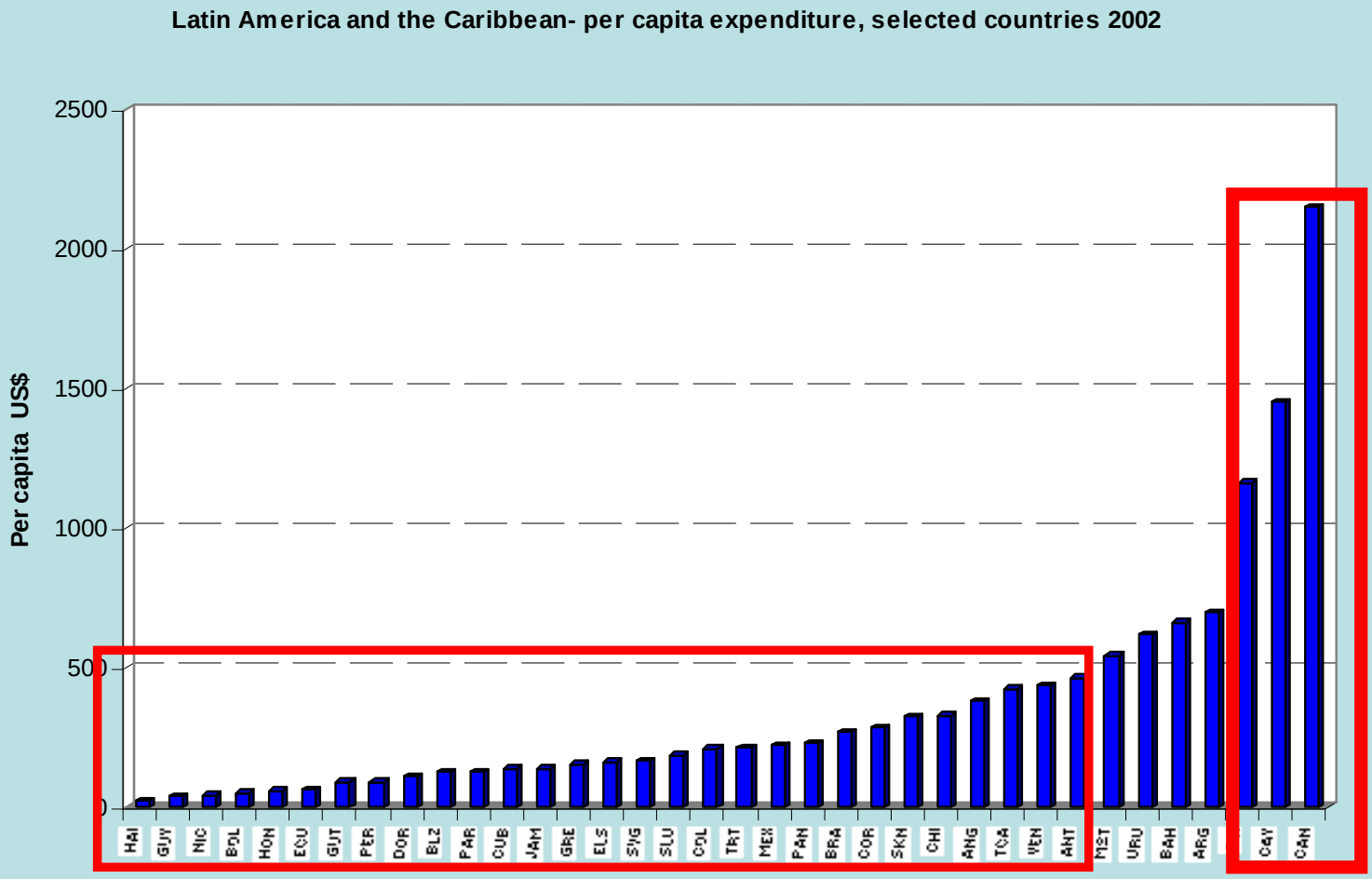
- Why we need to evaluate?
  - Medical point of view
  - Economics point of view

Refusing to make difficult estimation decisions does not make the problem of having to make difficult choices disappear!!

National resources allocated to health



Health expenditure per capita



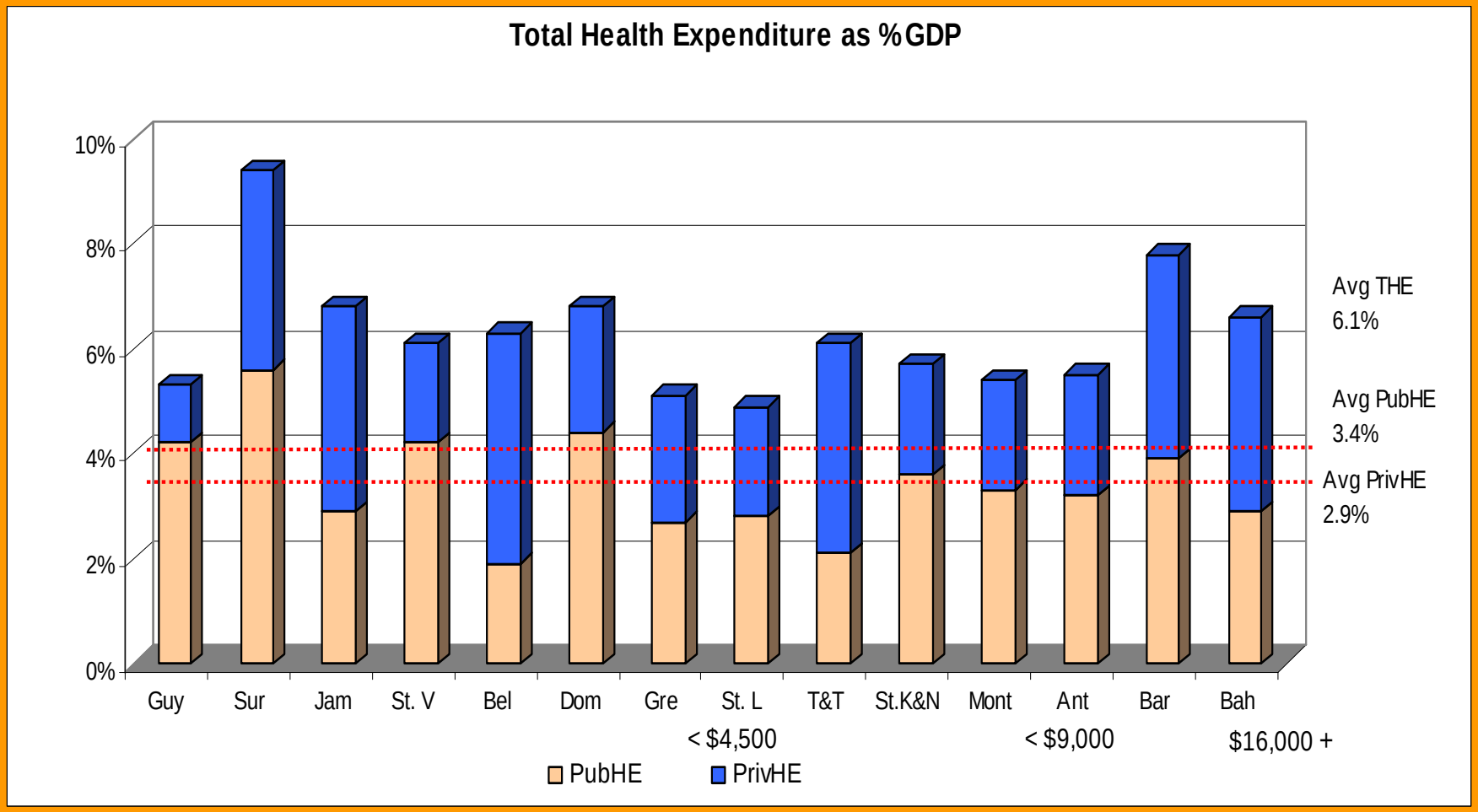
Health Expenditure: 2001

	Pob (000)	GDP per cap	HE per cap	Total HE (%GDP)
Guy	764	943	50	5.3%
Sur	432	1914	153	8.0%
Jam	2627	2982	191	6.4%
St. V	112	3112	190	6.1%
Bel	256	3145	198	6.3%
Dom	71	3697	252	6.8%
Gre	103	3881	198	5.1%
St. L	158	4184	204	4.9%
T&T	1267	7068	432	6.1%
St.K&N	46	7451	425	5.7%
Mont	4.3	8070	436	5.4%
Ant	76	9055	497	5.5%
Bar	270	9444	734	7.8%
Bah	307	16249	1069	6.6%
Average		**5,800**	**359**	**6.1%**

$ 1,069 in the Bahamas ($1,124 ppp) to $50 in Guyana, ($362ppp)

Report of the Caribbean Commission on Health and Development. 2006

The Caribbean: Total health expenditure



Report of the Caribbean Commission on Health and Development. 2006

Fiscal space

- The fiscal capacity of Caribbean countries to increase allocations to health depends on a mix of factors having both positive and negative implications. These include:
  - the levels, composition and efficiency of collection of revenue,
  - the extent of debt repayment obligations,
  - levels of income, unemployment and poverty and
  - obviously, the prospects for overall economic growth

Growth of Real Income Per Capita in 2000 PPP$, 1970–2000

	In 2000 PPP$ Real Income Per Capital Rate of Growth					Rate of Economic Growth		GDP at Current prices US$mn
Countries	1970	1980	1990	2000	1970-2000	2001	2002	2002
Antigua and Barbuda	1,692	2,818	7,667	9,061	5.8	1.5	2.1	721.0
Bahamas, The	12,154	14,658	15,913	16,875	1.1-	2.0	0.7	5,050.0
Barbados	6,507	12,288	13,118	14,770	2.8-	3.4	0.5	2,598.0
Belize	2,556	3,155	4,185	5,056	2.3	4.9	4.4	928.0
Dominica	1,191	2,493	4,282	5,002	4.9-	4.2-	4.6	258.0
Grenada	1,712	2,294	4,370	6,467	4.5-	4.4-	0.4	401.0
Guyana	2,728	2,584	2,258	3,494	0.8	2.3	1.2	722.0
Jamaica	3,220	2,955	3,692	3559	0.3	1.5	1.1	8,365.0
Saint Kitts and Nevis	2,332	3,759	6,863	10,842	5.3	2.3	0.7	356.0
Saint Lucia	2,612	2,615	4,988	5,689	4.3-	4.5	0.2	677.0
Saint Vincent and the Grenadines		2,132	3,835	5,311	5.3-	1.0	1.7	346.0
Suriname				4,178-	0.2			700.0
Trinidad and Tobago	6,931	9,620	6,473	8,438	0.7	2.8	4.6	9,371.0
Americas	10,017	12,656	14,261	17,239	1.8			
Canada and United States	16,985	21,448	26,961	33,850	2.3			
Latin America and the Caribbean	4,170	6,198	5,896	7,035	1.8			
Caribbean Countries	4,386	5,160	5,236	6,096	1.1			

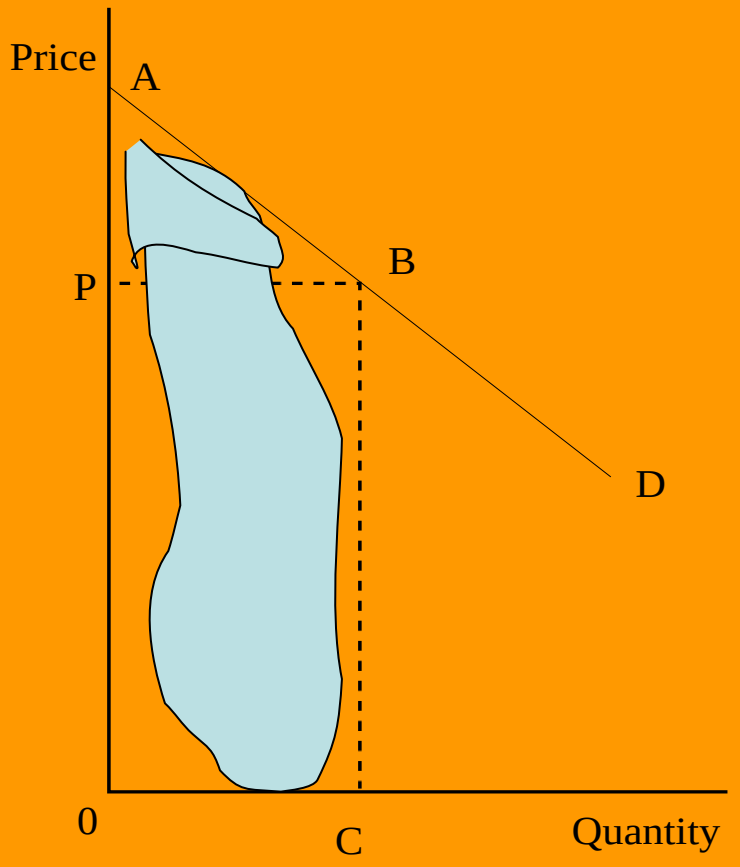
Report of the Caribbean Commission on Health and Development. 2006

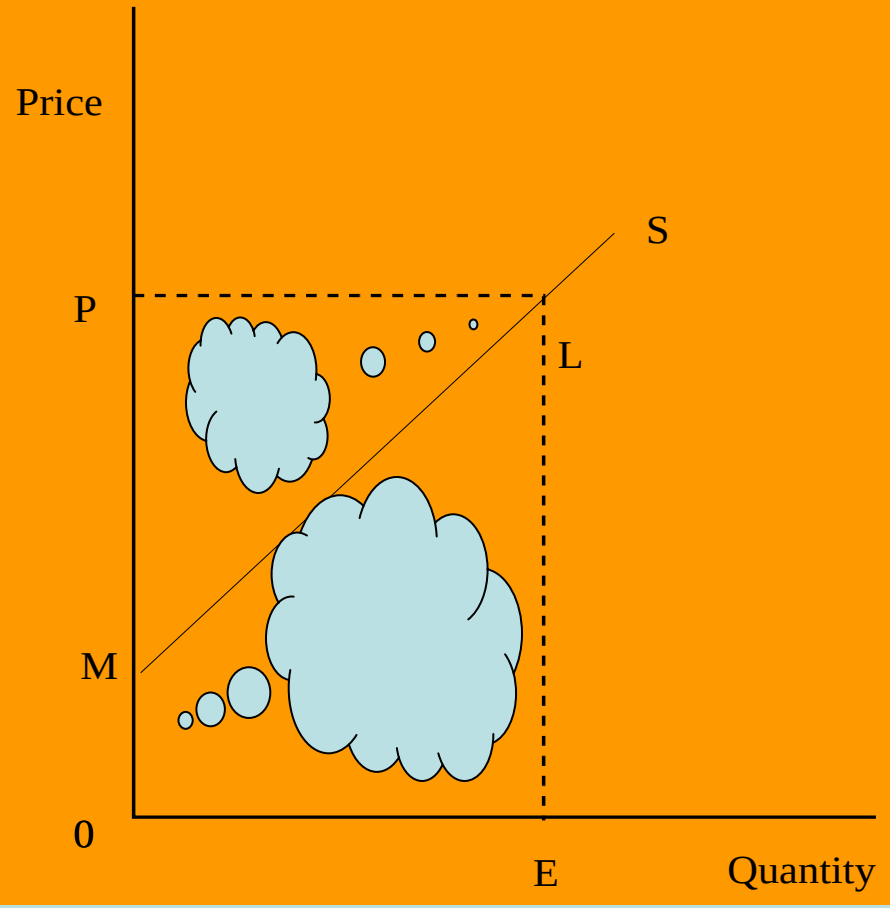
"It appears to be some sort of tax cut promise."

Economic Evaluation: An Introduction

- Few concepts
  - Supply and demand
  - Utility and benefit
  - Welfare theory

Graphs of Demand and Supply





D **= demand curve**

Area under demand curve *ABC*0 = gross benefits from consumption.

ABP **= <u>consumer surplus</u>=area between demand and price.**

S **= supply curve**

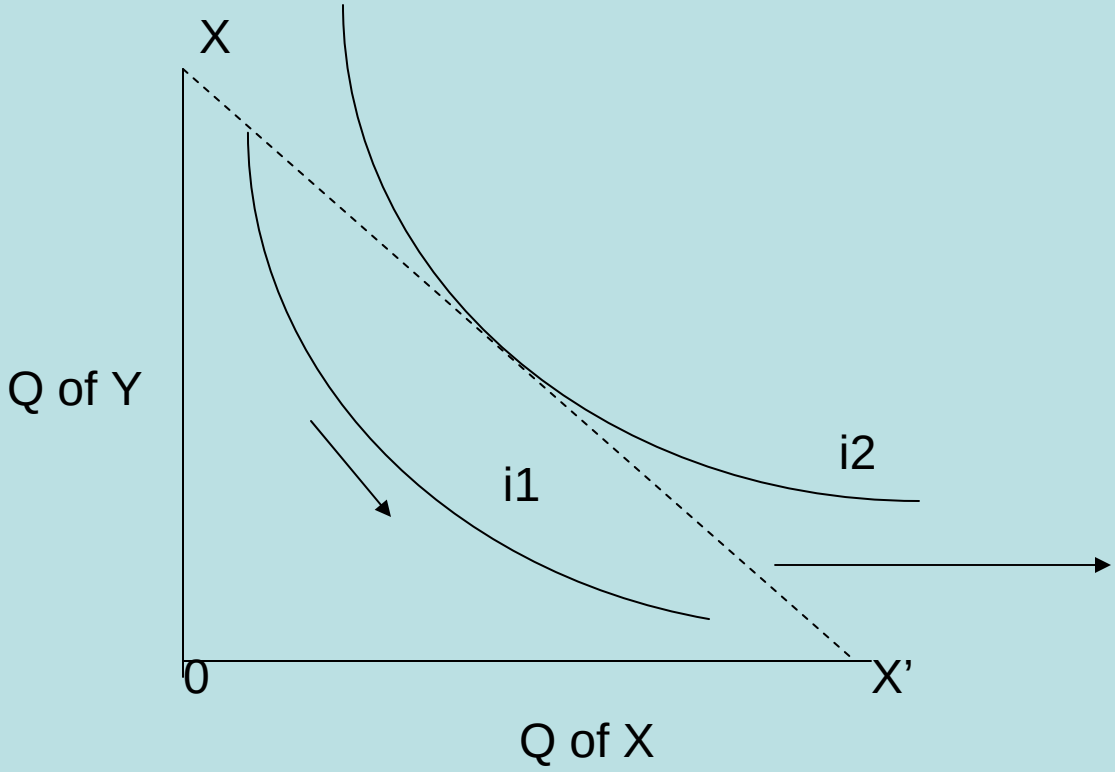
Area under supply curve 0*ELM* =cost of production.

PLM **=<u>producer surplus</u>=area between price and supply**

Goods and services

- Scarcity of Goods and services due to the limited availability of resources (the factors of production)
- production possibilities frontier or curve (PPF).

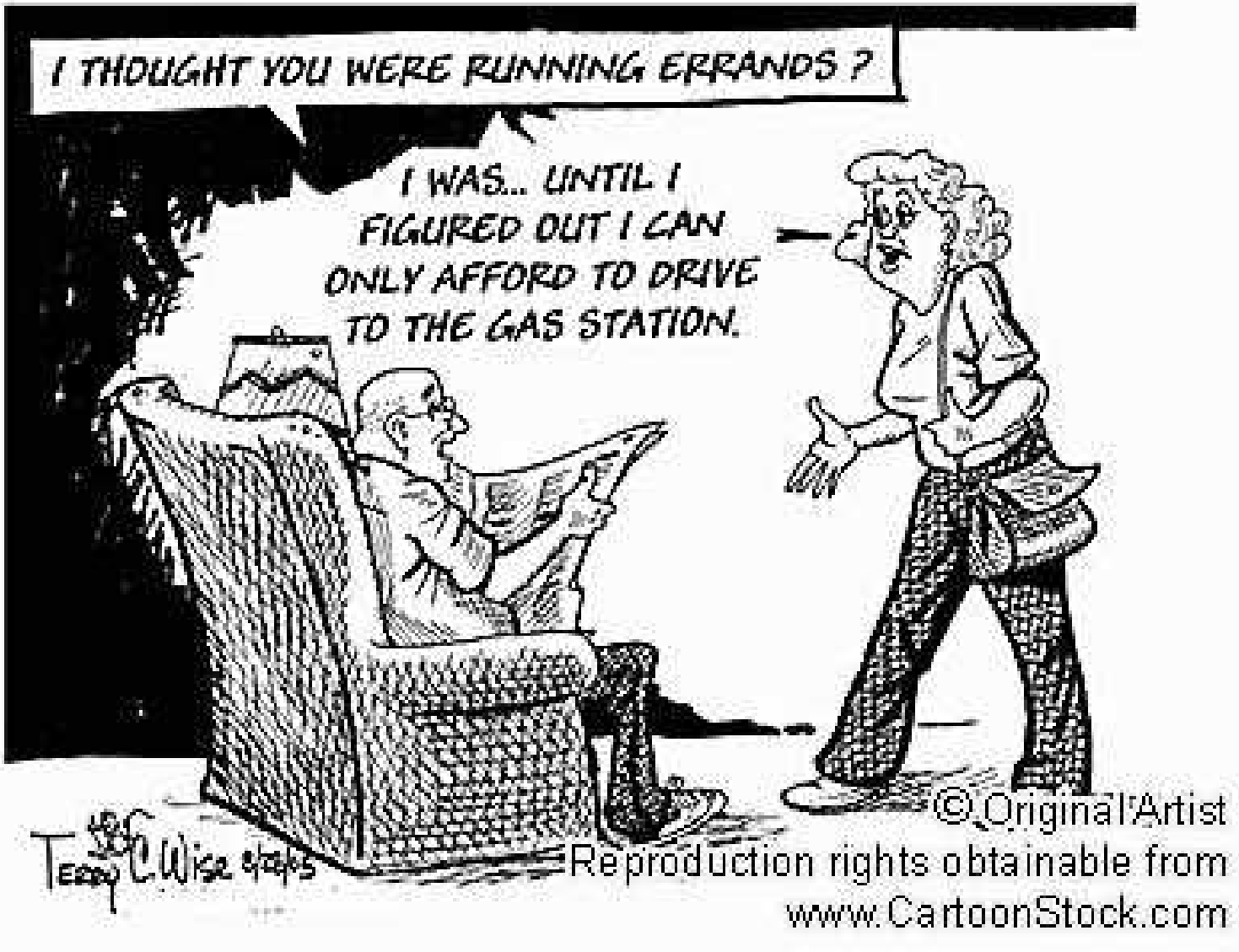
Economic Evaluation: An Introduction



Price willing to pay (WTP)
Subjet to the limitation
Of the income

Benefit=WTP=price

Utility and benefit



Resource limitations…. Affordability under the avaliable resources…..

Economic Evaluation: An Introduction

- ***Welfare analysis*** is a systematic method of evaluating economic implications of alternative allocations. It answers the following questions:

  1. Is a given resource allocation efficient?
  2. Who gains and who loses under various resource allocations? By how much?

- ***Partial analysis*:** Evaluates outcomes in a subset of markets assuming efficiency in others.

Economic Evaluation: An Introduction

Welfare economics is a branch of economics that uses microeconomic techniques to simultaneously determine the allocational efficiency within an economy and the income distribution associated with it. It attempts to achieve social welfare by examining the economic activities of the individuals that comprise society.

***Welfare economics*:** A methodological approach to assess resource allocations and establish criteria for government intervention.

Economic Evaluation: An Introduction

Two approaches:

- Neoclassical approach (it is possible to construct a social welfare function simply by summing all the individual utility functions)

- New welfare economics approach (It explicitly recognizes the differences between the efficiency part of the discipline and the distribution part and treats them differently)

Economic Evaluation: An Introduction

There are two sides to welfare economics: economic efficiency and income distribution. Economic efficiency is largely positive and deals with the "size of the pie". Income distribution is much more normative and deals with "dividing up the pie".

Economic Evaluation: An Introduction

Economic efficiency- Situations are considered to have distributive efficiency when goods are distributed to the people who can gain the most utility from them.

Economic Evaluation: An Introduction

Income distribution

It embodies value judgements about interpersonal utility. The social welfare function is a way of mathematically stating the relative importance of the individuals that comprise society


$\sum m_3 \sqrt{2\pi R^2} =$
$mc^2 + \sum \frac{xy}{2ab} \cdot \frac{xyz}{\sqrt{Ff^2}}$
THINK TANK

Economic Evaluation: An Introduction

Evaluation: An Introduction

	Private perspective	Managerial purposes	Efficeincy and (social iimpact)		Budgetary accounting
					CE-CM
Evaluation from the			costs	Methods: CE, CBA, CU, CM, EIA	
					CBA-EIA
	Social perspective	Public Policies	Optimality (efficiency and equity)		Shadow pricing-distributional weight

Evaluation: An Introduction

Economic consequences	cost of disease	value of the loss as % of GDP/ health budget
	short term/Micro data sets	Variations in main macro ecnomic variables
	long term impact/Macro-economics	Impact on GDP growht
Ec Evaluation of projects	Cost effectivenes	Efficiency measure
	Cost Minimization	Scale of cost
	Cost Utility	Scale of utility
	Cost Benefit	Monetary value

Evaluation: An Introduction

Economic consequences

cost of disease	value of the loss as % of GDP/ health budget	lack of conterfactual- don't address causality	presents good direct /indirect/intangible costs	
short term/Micro data sets	Variations in main macro ecnomic variables	compares at the comparatively abstract macro level- use of micro data-	comsuption+savings, labour supply and labor productivity, education and human capital acumulation	out of pocket expenditure--- subtitution effect and income effect--future earnings and development of human potential
long term impact/Macro-economics	Impact on GDP growht	compare to macrovariables- uses life expectancy or adult mortality	caution on results bc based on cause-specific adult mortality of limited quality	

Impact Evaluation: Methods

Summary of Quantitative Methods for Evaluating Program Impact

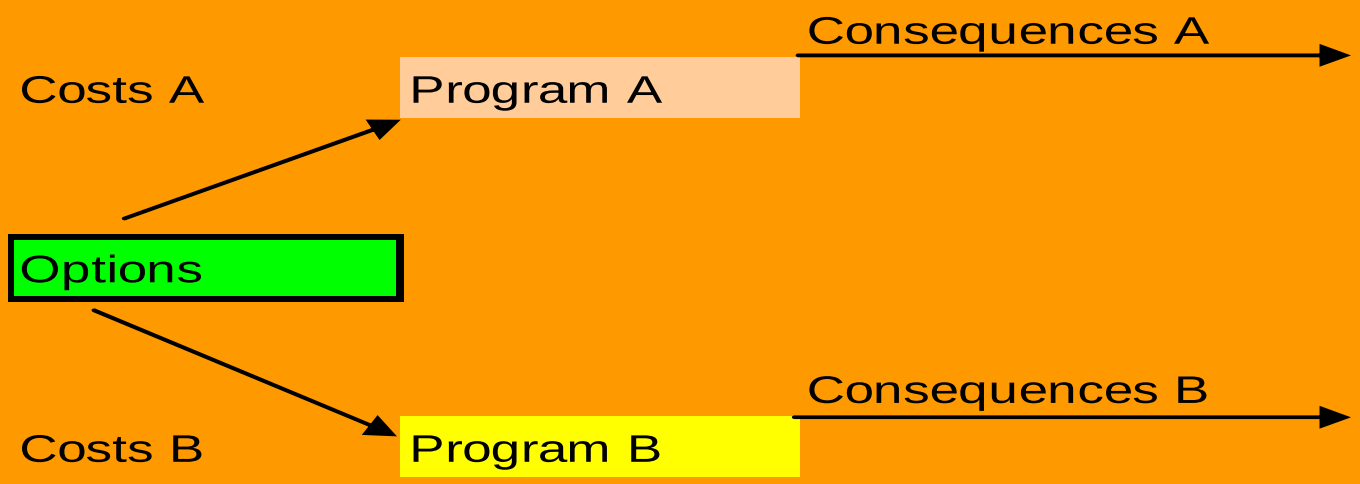
- Experimental or Randomized Control Designs
  Randomization

- Non-experimental or Quasi-Experimental Designs
  - Matching methods or constructed controls,
  - Double difference or difference-in-differences methods
  - Instrumental variables or statistical control methods
  - Reflexive comparisons, in which a baseline survey of participants is done before the intervention and a follow-up survey is done after.

.

Impact Evaluation: Methods

Economic Evaluation: An Introduction



-Identify options
-Choose among options
-Type of costs
-Consequences to consider

Economic Evaluation: An Introduction

Cost minimization

(C1-A)

(C1+C2+C3) - (A1+A2+A3)

Cost-effectiveness

(C1-A)/E

(C1+C2+C3) - (A1+A2+A3)/E

Cost-utility

(C1-A)/U

(C1+C2+C3) - (A1+A2+A3)/U

Cost-benefit

(D)-(C1+C2+C3)

((D+A1+A2+A3) - (C1+C2+C3)

A= Savings C= Costs

Economic Evaluation

- Elements to make decisions
  - When the possibility of choosing is not cleaar
  - When there is an option to choose
  - When the consequences are relevant

Economic evaluations and Impact evaluations are instruments of support to help you to structure the decision making process. It allows you to incorporate consequences in short/medium and long term options

Benefits of using the instrument….

….in Public health:

- Contributes clarity in the decision making process
- The process of decision allows to include more options ---- a difference of intuition
- Allows to document why we take that decision
- Allows to justify why option A and not option B
- Allows to assure the major benefit/utility/welfare

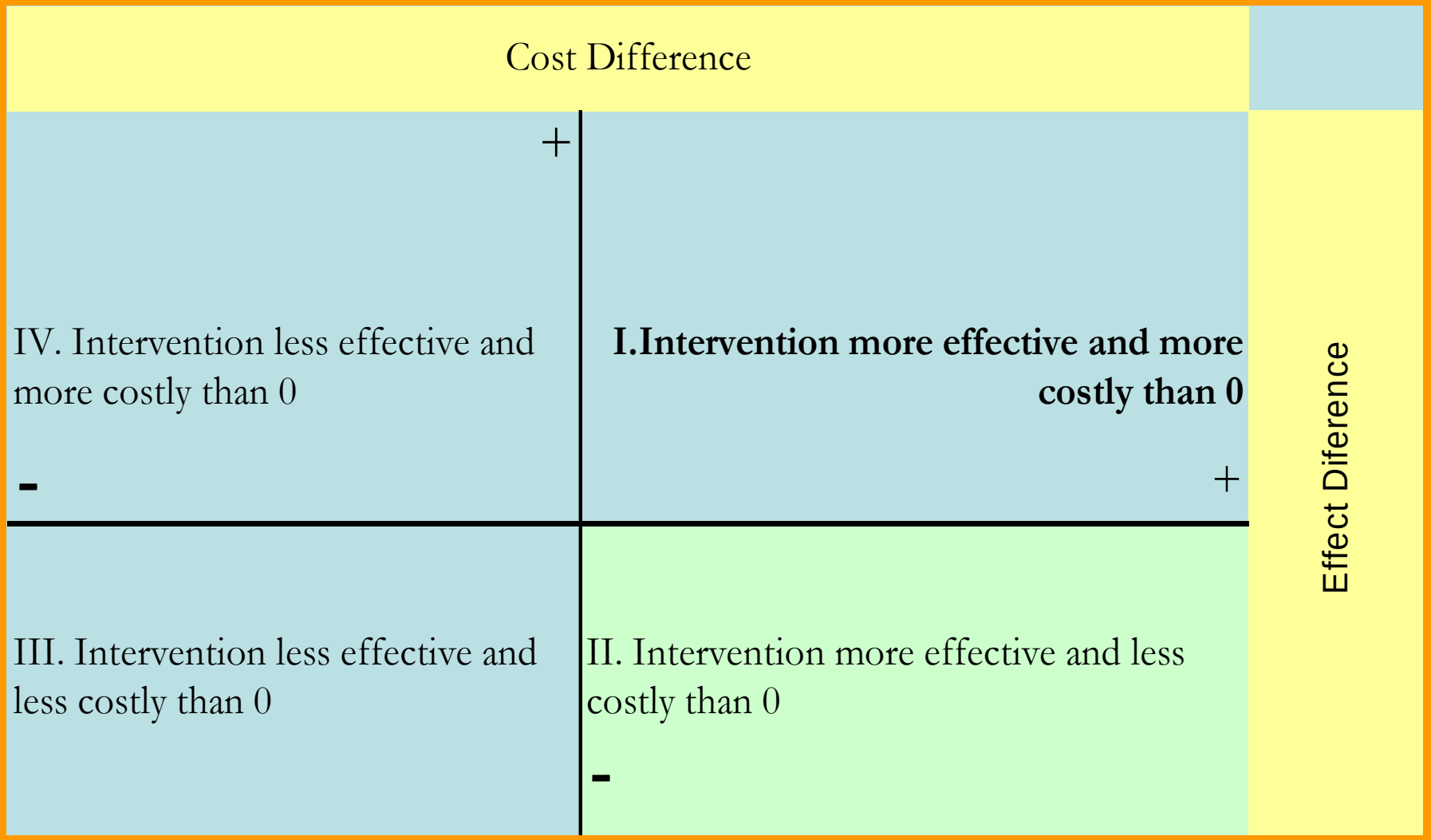
Economic Evaluation

Is there comparison of two or more alternatives?

Are both costs (inputs) and consequences (outputs) of the alternatives examined?

NO		YES
Examines only consequences	Examines only costs	
Partial evaluation		Partial evaluation
1.A	1.B	2
Outcome description	Cost description	Cost-outcome description
Patial evaluation	Partial evaluation	Full evaluation
3.A	3.B	4
Efficacy or effectiveness evaluation	Cost analysis	Cost-effectiveness analysis Cost-Benefit analysis

The cost effectiveness plane



Summary

	COST	RESULTS
COST-MINIMIZACIÓN	**MONETARY**	**EFECTIVITY**
COST-EFECTIVENESS	**MONETARY**	**UNIT OF ANALYSIS**
COST-UTILIDAD	**MONETARY**	**QALYs o HYEs**
COST-BENEFIT	**MONETARY**	**MONETARY**

What is behind each economic evaluation

Cost minimization

(C1-A)

(C1+C2+C3) - (A1+A2+A3)

Cost effectiveness

(C1-A)/E

(C1+C2+C3) - (A1+A2+A3)/E

Cost Utility

(C1-A)/U

(C1+C2+C3) - (A1+A2+A3)/U

Cost benefit

(D)-(C1+C2+C3)

((D+A1+A2+A3) - (C1+C2+C3)

A= Savings

Cost Minimization

- It is used when the alternatives subject to comparison have the same result and the same efficacy, and it is relevant to compare the costs. The option with lower cost is the more efficient

- Example:
  Comparing one brand new medicine with a generic medicine

- Before using this tools there MUST be demonstrated that the alternatives have the same efficacy and not just to assume that the efficacy is the same (case of generics…)

Cost Effectiveness

- It is used when the alternatives to compare have the same result but not the same effectiveness – then we need to measure the cost to achieve each unit of health in each alternative.
- The cost are measure in money (any type of currency) and the effectiveness in units of the desire result up to the years of life saved or years of life lost
-
- The result is expressed as a cost –effectives rate.

Example-cost effectiveness

Cost per patient and effectiveness per patient in each option
Available of treatment

Treatment strategies								
Treatment one			Treatment two			Treatment three		
Alternative	Cost	effectiveness	Alternative	Cost	effectiveness	Alternative	Cost	effectiveness
A	100	10	F	200	12	K	100	5
B	200	14	G	400	16	L	200	8
C	300	16	H	550	18	M	300	12
D	400	19						
E	500	20						

Karisson-Johanneson-1996

1000 people per group

Cost utility studies

- It is used when the alternatives to compare do not have the same result neither the same efficacy or when one of the dimensions requires is quality of life
- Utilities – are scales to measure the level of suffering, disability etc due to diseases.
- The utilities are used to adjust the years of life left to live after the disease, to create an equivalent measure to the Healthy life years = years of life adjusted by quality (AVACs [QALYs]).
- The result is presented as a cuocient- cost utility (C/U).

Cost benefit

- With this analysis you can define which projects provide a greater marginal social benefit than its marginal social cost…
- The measure of the results of the options is dome with monetary units

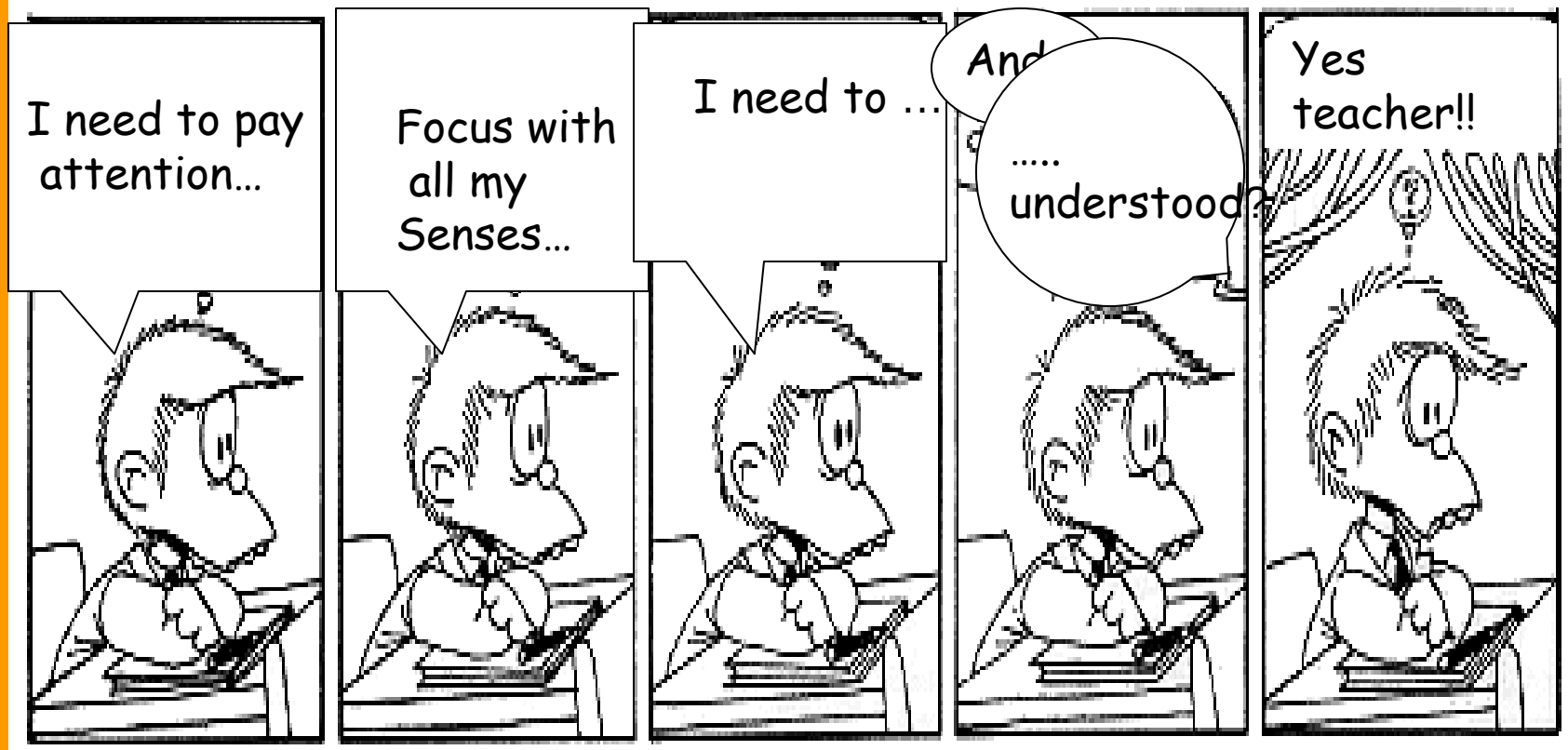
Estudios de Costo-Beneficio

- Estos estudios relacionan los costos de un programa o tratamiento con los resultados del mismo, ambos expresados en términos monetarios.
- Costo ($)/Beneficio ($) o
  Costo ($) – Beneficio ($).
- Es el único tipo de evaluación económica que permite evaluar Eficiencia Asignativa.
- Es el único que está anclado en la “Teoría del Bienestar”

Cost benefit

- Allows to compare programs from the health sector with programs of the other sectors of the economy – for ej. Education

After lunch….


I need to pay attention…
Focus with all my Senses…
I need to …
And
…..
understood?
Yes teacher!!

Economic Evaluation: List of ten questions to ask of a study

1. Was a well-defined question posed in an answerable form?
2. Was a comprehensive description of the competing alternatives given?
3. Was the effectiveness of the programmes or services established?
4. Were all important and relevant costs and consequences for each alternative identified?
5. Were costs and consequences measured accurately in appropriate physical units? (e.g. hours of nursing time, physician visits)
6. Were costs and consequences valued credibly?
7. Were costs and consequences adjusted for differential timing?
8. Was an incremental analysis of costs and consequences of alternatives performed?
9. Was allowance made for uncertainty in the estimates of costs and consequences?
10. Did the presentation and discussion of study results include all issues of concern to users?

Economic Evaluation: Aplication of the 10 questions

Abbreviated NHS EED abstract for the full economic evaluation by Yang et al.

Study question	To compare effectiveness and costs of alternative treatments for patients with isolated medical compartmental osteoarthritis of the knee.
Alternatives	Unicompartmental knee arthroplasty (UKA) versus compared total knee arthroplasty (TKA).
Type of economic evaluation	Cost-effectiveness analysis (cost-consequences).

Economic Evaluation: Application of the 10 questions

Methods

Source of effectiveness data: Prospective cohort study with matched controls that were comparable in terms of age, gender and prognostic features. The sample size included 100 patients (50 per group) and was followed up for six months.

Primary outcomes: mean operating times, days required for independent ambulation, time to achieve 90 degree flexion, hospital stay, postoperative drainage, haemoglobin levels; motion.

Cost analysis: The perspective of the economic analysis was not reported, although costs reflected hospital bills. No information was reported about categories of costs included, resource quantities used or the price year. Discounting was not performed, and was not relevant since costs were incurred within a short time.

Economic Evaluation: Aplication of the 10 questions

Main findings

UKA was a more cost-effective procedure than TKA, with patients presenting lower postoperative drainage, quicker rehabilitation and independent ambulation, achieving flexion of 90 degrees faster and a greater range of motion at a lower cost (i.e. SGD$8,700 for a UKA patient versus SGD$12,000 for a TKA patient; $p<0.01$).

Estimate of measure of effectiveness: Although the clinical data was derived from a prospective cohort study with well-matched patients, a randomised controlled trial would have minimised the potential for bias and confounding factors. It was not clear whether the study sample was representative of the study population, which would affect the external validity of the study results. Quality of life was not evaluated.

Estimate of costs: The authors provided limited information on costing methodology. Consequently, it cannot be assessed whether all relevant costs were included in the costing. Additionally, resource utilisation was not reported separately from unit costs. Charges, instead of costs, were considered without further charge-to-cost adjustments. The costs were, appropriately, not discounted. The price year was not reported.

Workshop: Policy Analysis and Decision-Making with Emphasis on Chronic Non-communicable Diseases

Bridgetown, Barbados

October 15-17, 2007

Economic Evaluation: An Introduction

Pan American Health Organization
Regional Office of the World Health Organization

Amparo Gordillo-Tobar. MD. PhD
Health Systems Strengthening Area
Health Policy Unit
Pan American Health Organization

Thank you for your attention

Amparo Gordillo-Tobar.

gordilam@paho.org