**HEALTH ECONOMICS**

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**INTRODUCTION**

Health economics is a branch of Economics concerned with issues related to scarcity in the allocation of health and health care. In broad terms, health economists study the functioning of the health care system and the private and social causes of health-affecting behaviours. Usually health status increases as the quantum of inputs increase; but beyond a point the relationship may be reversed.

**SOME BASIC CONCEPTS**

**Gross Domestic Product (GDP) –**Money value of the sum of all commodities and services produced in an economy, estimated without double counting. Usually done in terms of money value.

**Gross National Product (GNP)-** Sum total of the market value of all goods and services produced by the country’s nationals in a specified time period estimated without double counting.

**Gross National Income –** Instead of ‘product’, all income accruing to all nationals from all sources

**Per Capita Income –** National Income/ Total population

**State Domestic Product (SDP)**

**Sectors contributing to GDP**

**Primary-** Agriculture, Mining and Fishing

**Secondary –** Industry & Manufacture

**Tertiary Sector – Services**

Entertainment

Banking

Insurance

Hospitals

Hotels

Expenditure on Health

Governmental Expenditure

Out of pocket expenditure

Health Financing

**Why should economic theory have any relationship to health and health care?**

Despite improvements in health, costs of health care have continued to rise.There is little evidence that the increased spending has contributed to better health (Abel smith, 1996). Too many resources are being spent without improvement in overall health (Fuchs, 1993). Health economics is about resource management-what is affordable and desirable and what is not

**DEFINITIONS**

**Economics -** Economics is the science dealing with efficient use of resources

**Health economics –** The study of the application of economic theory to health and health care

**Economic evaluation –** Comparative analysis of alternative courses of action in terms of both their costs and consequences **(Drummond et al, 1987)**

**WHEN IS ECONOMIC EVALUATION APPROPRIATE?**

3 questions are asked of any intervention before economic evaluation

Can the intervention work?

Does it work in a real life situation?

Does it reach those whom it is meant to reach?

 **(Drummond et al, 1997)**

**To make comparisons**

1. Identify whether there are two alternatives that can be compared.
2. Which of the two interventions will give the best outcome.

**INPUTS – resources consumed**

Direct costs (salaries and consumables) e.g. fluoride rinse.

Indirect costs (production losses)

Intangible costs (pain and suffering)

**OUTPUTS – changes in health**

Natural units (tooth surfaces saved)

Utility measures (life-years gained by an intervention)

Monetary units

**TYPES OF ECONOMIC EVALUATION**

Both the costs and consequences of the program under consideration are quantified

Comparisons are made between two or more alternative programmes

**COST MINIMIZATION ANALYSIS**

Identify and compare the costs of alternative health programmes, without explicitly estimating concomitant health consequences.

**Results are reported usually as *cost per service provided*.**

**COST BENEFIT ANALYSIS**

Quantify the costs and health consequences associated with a health care programme.

Monetary values are assigned to both the costs and health consequences.

Provides a way to assess whether the benefits are worth the costs since both outcomes are measured in the same units.

Limitation – health consequences must be measured in economic terms.

**COST EFFECTIVENESS ANALYSIS**

Used to compare any intervention with any other intervention, provided the same outcome measure is used. Use measures of health effects for the valuation of health consequences

**COST UTILITY ANALYSIS**

Health consequences measured in units that estimate the quality of health outcome associated with a particular intervention. Final effects are measured than intermediate effects.

Useful when

Quality of Life is important outcome.

When a wide range of health care programmes are being assessed, each having a different measure of effectiveness.

**STAGES OF ECONOMIC ANALYSIS**

Define the health intervention under consideration and specify the perspective of analysis.

Well specified question and the perspective be posed to address cost­effectiveness issues (Drummond et al., 1987).

* + Are dental sealants worth the cost?
	+ Is a programme that applies dental sealants in a school-based setting to prevent pit-and-fissure caries preferable to a programme of regular recall examinations, health education and treating caries lesions in private dental offices with conservative amalgam restorations as the lesions develop?

Define the health intervention under consideration and specify the perspective of analysis. Viewpoint of the analysis dictates which costs and consequences are relevantof the patient, the clinician, the third-party payer (public or private) or society (the broadest, most inclusive perspective).The viewpoint of the analysis dictates which costs and consequences are relevant. .

**2. Identify alternatives**

Cost-effectiveness analysis compares the costs and consequences of two or more alternative programmes.

To compare programmes and to determine the applicability of the analysis to other programmes, a detailed description of competing programs must be provided.

Appropriate assessment of the costs and consequences depends on the identification of who does what to whom, when, where, how often and what the results of the programme are (Drummond et al, 1987)

**Relevant questions will be determined by the perspective of the evaluation**

**To ensure a complete comparison of alternative strategies, one should also consider a 'do nothing' or status quo strategy.**

**3. Identify, measure and value costs**

Once the question is specified the costs and consequences are considered.Relevant costs will be determined by the perspective of the analysis.From a patient's perspective, costs may be limited to out-of-pocket expenses for provision of services, insurance premiums for coverage of dental services or taxes used to support public programmes.Averted costs are also important from a patient's perspective. *E.g.-* any savings that may be attributable to prevent disease. From a clinician's perspective, applicable costs may be those associated with the purchase of equipment, rent for clinic space, supplies or additional personnel required to implement a programme.Costs for a third-party payer may include the amount of reimbursement for covered services. Societal costs generally include all costs associated with a programme, without regard to the person or organization that incurs the costs.Costs can be categorized in a variety of ways, and the same descriptive term may refer to different components*. (Petitti, 1994)*

***An important caveat in estimating health care costs is the distinction between costs and charges.***

**CHARGES**

**PAYMENT for that service (reimbursement)**

The COST of a treatment or service

* + Use of charges rather than costs may lead researchers to draw unwarranted conclusions about the economic efficiency of one programme relative to another **(Finkler, 1982).**

The incremental cost is the extra cost of providing one additional service or treating one additional patient. In contrast, the average cost is the mean cost per service or per patient.

Average costs are not comparative and are not useful or appropriate costs for economic evaluation ***(Finkler, 1982; Detsky and Naglie, 1990).***

**SOURCES OF COST DATA**

Sources are variable depending on the type of programme being evaluated and the perspective.Cost estimates for medical services often come from third-party databases (public and private). But public and private insurance coverage for dental services is limited in most of the countries. Consequently, data sources that may be available for estimating costs of certain medical procedures or services provided in institutions such as hospitals may not be available for estimating the cost of dental services. Sample surveys of the market value of goods and services may be used to estimate cost when other data sources are not available.

**4. Identify and measure health consequences and other impacts of the heath intervention**

Effectiveness data should be available as with the cost, assessment of health consequences is also dependent on the perspective of the analysis. Health consequences may include the community; Subpopulations within a community that may be designated by age, gender, race, race-ethnicity, income level or other socio-demographic and economic variables; Individuals within a community. The health effects of community­based programmes are measured generally at the population or subpopulation level. Evaluations of these programmes generally assume a societal perspective. Measures used for assessing the health consequences of community­based oral health programmes. Most community-based programmes have focused on the prevention of dental caries, and effectiveness measures have reflected this emphasis. For example, surfaces saved or caries prevented have been reported, as have changes in the incidence rate of dental caries. As such, these measures cannot be used to assess the impact of dental caries on quality of life.

**4. Identify and measure health consequences and other impacts of the heath intervention**

Other measures –

Number of quality-adjusted tooth years…. provide an estimate of the ultimate effectiveness of these programmes.The 2 programmes are not compared if the health consequences are specified in different units.Marginal effectiveness is considered which provides an estimate of the additional health benefits that may be achieved by implementing one programme instead of another.

**SOURCES OF EFFECTIVE DATA**

Ideally, data would be available from an experimental study design, such as a randomized clinical trial, that evaluates the effectiveness of two or more alternative strategies. However, randomized clinical trials are often not available and data must be obtained from other sources.Discussion of methods for meta-analysis and conduct and evaluation of clinical research is beyond the scope of this chapter and is available in other texts.

**5. Discount future costs and effectiveness**

Assessments of alternative community-based programmes are done at some point in time, usually the present.However, the costs and consequences associated with these programmes do not necessarily occur at the same time. For example, consider the two alternative programmes that seek to prevent dental caries over a 10-year period……...Over a 1O-year period, costs would occur or recur over time, the benefits attributable to the two programmes, as measured by caries incidence rates, quality-adjusted tooth years, may occur differentially during the time period.Some individuals may not develop caries during the entire period. Others may develop caries in each year of the 10-year period. Still others may develop caries in each of 2 years in the two-year period. If a policy-maker had to determine which of these two programmes was more cost­effective, then the differential timing of the costs and benefits would have to be considered.To account for these differences, the value of the future costs is reduced or discounted.Discounting is a process for computing how much a dollar, payable one or more years from now, is worth today (Weinstein and Fineberg, 1980).

The basis for discounting is individual’s time preference for money. Money that is not spent today can be invested to yield a larger amount of real money in the future. Consequently, one should determine the present value of future money when assessing the costs of alternative programmes.One should also discount future health benefits.Years of life in the future are valued less than present years of life. Inconsistencies in the results of economic evaluations are noted when one fails to discount health benefits but discounts costs. For example, for any programme worth implementing this year, there is an alternative programme whosecosts relative to health consequences are less if implementation is delayed a year. The future value of money is less than the present value of money. Without discounting health consequences, this year's health effects are equal to next year's health effects, and next year's discounted costs are less than this year's costs. Consequently, failure to discount health consequences leads one to delay starting a health programme, since the cost-effectiveness ratio will be more favorable next year.

**6.Account for uncertainties that may
 exist in analysis**

Each source of data has some level of uncertainty and imprecision.Assessing the extent to which the results of the analysis change based on variation in inputs – sensitivity analysis.Sensitivity analysis can be done on estimates of cost, effectiveness, probabilities of various events, discount rates or the structure of the programme itself.If small variations in any input to the analysis change the relative cost-effectiveness of one programme to another, then additional data may be necessary to estimate the input more precisely. Alternatively, if the conclusions vary little while the inputs are varied over a wide range, then one can have increased confidence in the results.

**7. Address ethical issues**

Economic evaluations are intended to assist decision-makers in allocating limited health care resources. Results of these analyses are not intended to be used without appropriate consideration of the ethical issues associated with the decision. Health care programmes that benefit the poor, the elderly, individuals living in rural areas or other groups who may be at increased risk for disease may not be cost-effective relative to other programmes that benefit different groups. That one programme is more cost-effective relative to another is an important consideration in the decision-making process; however, it is not the only consideration

**8. Present and interpret results**

Presentation of the results may be in many ways. Ratio of marginal cost to marginal effectiveness.It will identify one of four relationships between alternative programmes: one programme will cost more and be more effective;whether, relative to other potential uses for limited resources, *the additional health benefit is worth the added cost..*one programme will cost more and be less effective; the programme should never be adopted, whether resources are limited or notone programme will cost less and be more effective; should always be adopted.one programme will cost less and be less effective provide options to decision-makers in times of retrenchment and budget cutbacks. Presentation of the results of an economic evaluation requires more information than just a display of the marginal costs and consequences of competing programmes. Factors as the perspective of the analysis, the time horizon used, sources of costs and effectiveness data and the discount rate used should be stated explicitly. Assumptions and judgments used in the analysis should be pointed out to the reader. Presentation of the results in such a manner allows the reader to assess the applicability of the results to his or her own programme.

**HEALTH ECONOMICS IN DENTISTRY**

Used less frequently in dentistry

Comparison of -

* Restorative materials

 (Smales and Hawthorne, 1996 ; Mjor et al, 1997) and

* Preventive techniques

 (Klock, 1980 ; Morgan et al, 1998)

1. Cost evaluation (C/B, C/E, C/M, C/U) of caries prevention showed that all caries preventive measures except fluoride gels, gave lower cost compared to fillings, and water fluoridation was the most cost-effective preventive measure. The reviewed studies show that there are contradictory results from studies on fissure sealant (low evidence values), fluoride rinsing (low and moderate evidence values), fluoride tablets (low evidence values), fluoride varnish (low evidence values) and from preventive programmes (low evidence values) and the proof in published economic evaluations is lacking (Kallestal et al, 2003)

2. C/EA was used to evaluate alternative methods (non-surgical & surgical procedures as well as the use of antimicrobial agents) of periodontal disease control. Data on costs were obtained from ADA publications of average charges for periodontal services.

The concept of quality-adjusted tooth-years (QATYs) was developed to provide an outcome measure

(1) Conservative non-surgical treatments not only have costs lower than surgical alternatives, but also maximize expected QATYs

(2) antimicrobial therapy used as an adjunct to non-surgical treatment is likely to be both effective and cost-effective (Bouckoms et al, 1987)

3. C/B and C/E of a long-term DHE program (3 yrs for infants aged 8 mon and mothers) for the prevention of ECC through home visits was evaluated.

Costs were based on UK National Health Service fees for treating children by GDPs and salaries for community dental officers in CDS in the UK.Comparisons were made with a slow releasing fluoride device (SRFD), community water fluoridation (CMF) & school based fissure sealant program (FSP). The cavities saved over the three year period indicated a B/C ratio for the DHE of 5.21 compared with SRFD of 4.17; CWF of 1.15 & FSP of 0.42. The C/E results were 1.92, 2.40, 8.66 & 23.74 respectively. (Kowash et al, 2006).

4. A systematic review of the clinical effectiveness and cost-effectiveness of routine dental checks of different recall frequencies (3-, 6-, 12-, 18-, 24- and 36-month) on the experience of dental decay in deciduous and permanent dentition was undertaken. There is little existing evidence to support or refute the practice of encouraging 6-monthly dental checks in adults and children. Moving to longer (more than 6-monthly) dental check frequencies, rather than shortening the currently practiced recall interval, would be more cost-effective. However, cost-effectiveness varies across risk groups (population recall policy or based on individual risk (Davenport et al, 2003)

**LIMITATIONS OF ECONOMIC EVALUATION**

Determination of the effectiveness of a programme.

Ethical issues are not addressed

Economic evaluations require resources (there is no minimum level of expenditure or health impact above which an economic evaluation should always be done and below which should never be done)

**CONCLUSION**

Allocating limited resources among a variety of health care programmes poses many challenges

It is difficult to consider the cost and consequences of these alternative programmes without quantitative methods.

Economic evaluation is necessary to produce the best health care and maximum benefit with minimum cost to the community based on available resources.

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