



**Alan Haycox**

BA MA PhD  
Senior Lecturer in  
Health Economics,  
University of  
Liverpool

**Euan Noble**

BSc MSc PhD  
Honorary Research  
Fellow, Prescribing  
Research Group

# What is health economics?

Published by Hayward Medical Communications

- Economics is the science of scarcity. The application of health economics reflects a universal desire to obtain maximum value for money by ensuring not just the clinical effectiveness, but also the cost-effectiveness of healthcare provision.
- Cost-effectiveness implies either a desire to achieve a predetermined objective at least cost or a desire to maximise the benefit to the population of patients served from a limited amount of resources.
- An associated concept is that of efficiency, which measures how well resources are used in order to achieve a desired outcome.
- Opportunity cost represents a very useful mode of thought in health economics, as it emphasises the explicit trade-offs that underlie resource use in the health services.
- All economic evaluations have a common structure which involves explicit measurement of inputs ('costs') and outcomes ('benefits').
- Health economics can help to inform and improve decision-making, as a systematic and objective system of thought.
- The very process of identifying alternative options to meet prespecified objectives and balancing resources and benefits represents a valuable mode of thinking for decision-making, irrespective of whether formal economic evaluation is undertaken.

## What is health economics?

***Economics is the science of scarcity. It analyses how choices are structured and prioritised to maximise welfare within constrained resources. We all use economics on a daily basis ('Do I buy the cheaper chocolate bar or pay a bit more for the nicer one?') as we work within our own resource constraints (our taste says, 'Buy the nicer one'; our bank manager says, 'Buy the cheaper one'). By comparing the costs and benefits arising from each option, we are able to optimise our decision-making. If we routinely use such economic principles in our private lives, then surely we should also apply them in our professional lives? This is the basis of health economics.***

Once healthcare decision-makers have accepted the need for choice, they must inform that choice by examining the costs and benefits of different options. However, it is important to recognise that in terms of economics, the field of healthcare exhibits a range of special characteristics. Essentially, the application of health economics reflects a universal desire to obtain maximum value for money by ensuring not just the clinical effectiveness, but also the cost-effectiveness of healthcare provision.

### Scarcity, choice and prioritisation

Scarcity of resources requires individuals to choose which goods and services they consume. The basis for their choice is the relative value that they place on each good or service. The structure of these relative values is the basis for their system of prioritisation.

### Cost-effectiveness

Health economics is dominated by a simple theoretical concept, that of cost-effectiveness (this is explored in greater detail in *What is cost-effectiveness?*<sup>1</sup>). In general, the concept of cost-effectiveness implies either a desire to achieve a predetermined objective at least cost or a desire to maximise the benefit to the population of patients served from a limited amount of resources. To achieve this aim, we use the tools of economic evaluation to select the most cost-effective options from a range of healthcare alternatives. An associated concept is that of efficiency.

### Efficiency

Efficiency measures how well resources are used in order to achieve a desired outcome. It has a number of different aspects.

*Allocative efficiency* measures the extent to which resources are allocated to the groups or individuals who can benefit most. For example, the benefits of statin treatment to high-risk patients are far in excess of the benefits to low-risk patients. Allocative efficiency therefore requires the high-risk patients to be targeted as a priority, resulting in an improved level of health outcome.

*Technical efficiency* measures the extent to which resources are combined to achieve the maximum outcome, or when the minimum amounts of a resource are applied to achieve a given outcome (for example, identifying the least expensive way to heal a peptic ulcer). The prescribing of unnecessarily long courses of drugs or unnecessarily expensive drugs implies technical inefficiency.

### Defining and measuring 'health outcomes'

Defining and measuring health outcomes is difficult, but such measures are the bedrock of health-economic evaluations. In addressing health outcomes, economists talk in terms of utility, which measures the strength of an individual's preferences for specific outcomes.<sup>2</sup>

There is a range of measures of survival (lives saved, life-years gained or five-year survival rates), but increasingly health services focus on improving quality of life (reduced pain, greater mobility, improved sensory function). Health-related quality-of-life analyses measure the impact of treatments on the social, emotional and physical aspects of life from the patients' perspective.<sup>3</sup> Many techniques have been developed to place values on various states of health which can be held to be representative of the values of society as a whole. These quality-of-life 'weights' are then integrated with survival data to produce a single combined measure of the quantity and quality of life generated by healthcare interventions. Quality-adjusted life-years (QALYs) apply weights that reflect the quality of life being experienced by the patient (perfect health is equivalent to 1, death is equivalent to 0 and health states that may be regarded as worse than death have negative valuations).<sup>4</sup> The use of QALYs is still at an early stage of development and many methodological difficulties remain to be resolved.

## Definition of health

Health has no generally accepted definition, but has a wide range of physical, mental and social characteristics. The breadth of such characteristics and their essentially subjective nature emphasises the difficulties inherent in deriving an operational definition for this concept.

## Resources

When we consider the resources available to us, we normally think about financial resources. The economists' definition, however, is far wider and encompasses the time, energy and skills exhibited by the individual, together with the buildings and equipment that he or she may possess. A resource may therefore be consumed (time and effort expended in developing an idea) even if there is no associated financial payment.

## Defining and measuring cost

A distinction must be made between financial and economic concepts of cost. Financial costs relate to monetary payments associated with the price of a good or service traded in the marketplace. Economic costs relate to the wider concept of resource consumption, irrespective of whether such resources are traded in the marketplace. Thus, the time spent by patients in a hospital waiting room represents a real cost to them – despite the fact that no financial payment arises.

The economic concept of cost is based on the awareness that, when resources are used in a certain way, those same resources are not available for use in other activities, and the benefits which would have been derived from those other activities are sacrificed. In economics, these sacrifices are referred to as 'opportunity cost'. This is a concept familiar to all of us from our personal finances.

Suppose I can afford either to buy a new car or to take a foreign holiday. The opportunity cost of buying the car is losing the benefits of taking the holiday.

Opportunity cost represents a very useful mode of thought in health economics, as it emphasises the explicit trade-offs that underlie resource use in the health services.

## Opportunity cost

The economist perceives the true cost of any good or service in relation to the resources that are consumed to provide that good or service. The cost of the resources consumed is expressed as the value of the output that would arise through their next best alternative use.

## Techniques of economic evaluation

Economic evaluation provides a systematic and objective framework for drawing up a balance sheet of costs and benefits which can assist decision-makers to make more informed choices. All economic evaluations have a common structure which involves explicit measurement of inputs ('costs') and outcomes ('benefits'). The four main methods

**Table 1. Structures of economic evaluation**

Method	Measures of outcomes
Cost-minimisation analysis (CMA)	Assumed to be equivalent
Cost-effectiveness analysis (CEA)	Measured in natural units
Cost-utility analysis (CUA)	Measured in terms of 'utility' (for example, QALYs)
Cost-benefit analysis (CBA)	Reduced to their financial equivalent

of economic evaluation vary in terms of their evaluation of health outcomes. Each method is described briefly in Table 1.

## Cost-minimisation analysis (CMA)

In CMA, only the costs of the interventions under evaluation are measured. This technique is therefore restricted to when the health benefits of the healthcare treatments have been proven to be identical. An example would be a decision to prescribe a generic drug instead of a brand-name drug, which would be likely to achieve the same outcome at less cost. This form of evaluation cannot be used to consider different programmes or therapies with different outcomes.

## Cost-effectiveness analysis (CEA)

The term 'cost-effectiveness analysis' properly refers to an evaluation where the outcomes are one-dimensional. CEA is therefore used in health economics to compare the financial costs of therapies whose outcomes can be measured purely in terms of health effect (for example, years of life saved, ulcers healed). For instance, if we wanted to compare the use of a proton pump inhibitor to relieve severe reflux oesophagitis with the use of H<sub>2</sub> blockers to achieve the same end, we could calculate the costs per patient relieved of symptoms for each therapy. CEA is the most commonly applied form of economic analysis in the health economics literature, and is frequently used in drug therapy. However, it does not allow comparisons to be made between courses of action that have different outcomes (see *What is cost-effectiveness?*).<sup>1</sup>

## Cost-utility analysis (CUA)

This is similar to CEA in that there is a defined outcome, and the cost to achieve that outcome is measured in money. However, in CUA the outcome is measured in terms of survival and quality of life (for example, using QALYs). Since the endpoint may not be directly dependent on the disease state, CUA can, in theory, compare courses of action in different areas of medicine. In practice, this is not so easy since QALYs remain subject to much philosophical and technical criticism. The usefulness of QALYs is debated elsewhere (see *Implementing QALYs*).<sup>5</sup>

## Quality-adjusted life-years (QALYs)

The concept of the QALY is based on the belief that the aim of any health service intervention can be dichotomised between improving survival (increasing the quantity of life) and improving the ability to enjoy life (enhancing quality of life). By applying 'quality weights' to each additional year of life experienced after treatment, the QALY attempts to incorporate both of these elements into a single measure (see *What is a QALY?*).<sup>4</sup>

## Cost-benefit analysis (CBA)

In CBA, the benefit is measured as the associated economic benefit of an intervention, and hence both costs and benefits are expressed in money. CBA may ignore many intangible but very important benefits that are difficult to measure in monetary terms (for example, relief of

anxiety). It could also be seen to discriminate against those for whom a return to productive employment is unlikely (for example, the elderly or the unemployed). However, the virtue of this analysis is that it enables comparisons to be made between schemes in very different areas of healthcare, and even with schemes outside the field of medicine. For example, using CBA, the costs and benefits of expanding university education (the benefits of improved education and hence productivity) can be compared to establishing a back pain service (enhancing productivity by returning patients to work). This approach is not widely accepted for use in health economics.

## Marginal analysis – a little bit more, a little bit less

Marginal costs measure the additional cost increases or savings arising as a consequence of output changes within a healthcare programme. For instance, if a new treatment enables patients to be discharged from hospital a day earlier, it would be tempting (but wrong) to apply the average cost per bed-day as the associated saving of resources. This is because, unfortunately, all the fixed-cost elements (laboratories, kitchens and building maintenance) will be largely unaffected, with the only altered costs being those associated with the physical occupation of the bed (patients' meals and other 'hotel' costs). These are the marginal costs, where resource use is directly related to a change in the scale of service provision – the additional resource required to treat one additional patient, or conversely, the level of resource directly saved by treating one fewer patient.

## The importance of perspective

A key point to consider in planning an economic evaluation is the point of view from which the study should be conducted: from that of the health service, in which case only direct costs are considered; or from a societal viewpoint, in which case indirect costs (for example, productivity losses arising from ill health) are included as well. In general, the societal perspective is preferred, as it reduces the likelihood that important

costs will be ignored simply because they fall outside the focus of the study. However, a healthcare manager faced with a limited budget has a strong incentive to ignore the societal view and concentrate entirely on costs that have an immediate impact on his own budget.

Employing a societal perspective also incorporates the costs and benefits directly experienced by the patient. For example, the development of an insulin delivery system that avoids the need for daily injections would be likely to reduce the costs experienced by a diabetes patient in terms of pain and inconvenience. These privately-borne costs might be overlooked from a solely health service perspective, but they represent a vital component of the economic analysis: their reduction is likely to be a fundamental determinant of patient compliance, which in turn would lead to improved glycaemic control and a reduction in the health and financial burden associated with poorly controlled diabetes. For this reason, economic analyses should take the widest possible perspective in order to maximise their value to healthcare decision-making.

## Discounting

There is often a significant time-lag between the investment of health service resources and the arrival of the associated health gain. In general, we prefer to receive benefits now and pay costs in the future. In order to reflect this in economic evaluation, costs are discounted. For example, the rate set by the UK Treasury is currently 3.5%.<sup>6</sup>

## Uncertainty

Economics operates in the realm of the behavioural sciences and, as such, is beset by uncertainty. Any estimates of costs and benefits will also be affected by uncertainty concerning the exact values of those costs and benefits. In order to minimise the uncertainty, it is necessary to reflect accurately the balance of scientific evidence on clinical and cost-effectiveness through the application of evidence-based medicine.<sup>7</sup> Great care must be taken to utilise a balanced and impartial summary of the evidence with regard to anticipated treatment outcomes,



# What is health economics?

ideally in the form of a systematic review.<sup>8</sup> Where possible, a meta-analysis should be used to obtain a precise quantitative estimate of treatment effect.<sup>9</sup>

There will inevitably be certain areas where clinical evidence is either limited or entirely missing. When conducting a pharmacoeconomic analysis, it is often necessary to make assumptions to supplement the structure of evidence obtained from clinical trials and other sources. All pharmacoeconomic analyses must therefore include a detailed sensitivity analysis to assess the robustness of the study results in relation to variations in the certainty of the assumptions made. The economic appraisal can be said to be robust if the results are not influenced to any great extent by feasible variations in the value of any of the key underlying assumptions. A confidence interval that incorporates the value of no difference implies that the treatments being compared have not been proven to be significantly different.<sup>10</sup>

## Conclusion

Health economics represents a valuable tool for improving the information base upon which healthcare decisions are made. It can help to inform and improve decision-making, as a systematic and objective

system of thought. The very process of identifying alternative options to meet prespecified objectives and balancing resources and benefits represents a valuable mode of thinking for decision-making, irrespective of whether formal economic evaluation is undertaken.

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