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**HEALTH OUTCOMES:  
A HEALTH ECONOMICS PERSPECTIVE**

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## ABSTRACT

Interest in and a commitment to "outcomes" is growing. There is general agreement that "health outcomes" are a good idea but, as yet, no generally agreed concept of what health outcomes are about. This paper offers a conceptual framework for the discussion of health outcomes from the perspective of health economics. It is written for a non-economics audience. This framework helps clarify the conceptual basis for health outcomes and identifies an agenda for research and development.

The economics perspective on health outcomes draws on the analogy of the production process to clarify the relationships between health inputs, processes, outputs and final health outcomes. Jargon is kept to a minimum and technical points are expanded in self contained notes. A simple model of the production of health is described and then developed to include health promotion and non-health activities which are, nevertheless, beneficial to health. Conceptualising health outcomes with the economic framework provides the clarity needed to promote health outcomes and improve the effectiveness of health services.

Doing good in health care is no longer good enough; we need to do better. Health outcomes are about doing better. So too is health economics. By making objectives explicit, and by systematic comparison of the costs and effects or health outcome of alternative means of meeting these objectives, health economics provides the most useful perspective on health outcomes.

## 1. Introduction

There is growing interest, in Australia as elsewhere, in the concept of health outcomes and in re-orienting the health care system to focus on health gain. The National Health Strategy has reported that "it is important to shift the emphasis from funding and providing health services and institutions to providing care that improves health" (National Health Strategy 1992, p. 15). The NSW Health Department has embarked upon a Health Outcomes Program "to re-orient the planning, implementation and evaluation of health and related services" (NSW Department of Health, 1993, p. 2). Health outcomes have been included in the new Medicare (Commonwealth-State financing) agreements (Roy Harvey, personal communication). Whilst there is little disagreement that health outcomes are "the way to go", there is still a lack of clarity and indeed some confusion about what health outcomes actually are.

There appear to be two concerns that are driving this interest in outcomes; efficiency and accountability. Australia, like most other OECD countries, has succeeded in controlling the overall increase in health care expenditures but there is still concern that what is being spent is not being used efficiently or to maximum effectiveness (Hurst 1991, Altman and Jackson 1991). Pressures on the health care budget will continue with changing demographic patterns, epidemiology and advances in health care technology. At the same time, health care policy makers, administrators and clinicians at all levels are required to become more accountable. Health services are required to be more responsive to community and consumer preferences at a time when community expectations are being raised.

In health care now, doing good is no longer good enough; we need to do better. Hence the drive towards health outcomes; health outcomes are about doing better.

Economics is also about doing better, by making objectives explicit and by

weighing up the opportunity costs and benefits of alternative means to achieve those objectives. Consequently, health economics can offer a useful, we argue the most useful, perspective on health outcomes.

In this paper, the economics perspective on health outcomes is described. Once economics is brought to bear on outcomes, it becomes clear that outcomes are only one half of the framework. Resources and costs are relevant, too. In section 2, a simple generalised production model is described which is then extended to illustrate the production of health. Subsequent sections deal with the relation between inputs and outputs, the importance of costs, the production of health rather than health care, and with outcomes other than improvements in health.

The paper has been written to inform the debate about the meaning and importance of health outcomes. Economic jargon is kept to a minimum whilst setting the concept of health outcomes firmly within an economic framework. To this end, a number of technical points are explained in self contained notes. These can be omitted without loss of continuity.

## **2. Health outcomes: a production model.**

The production of any good or service can be thought of as a process in which inputs of various types are combined to produce a quantity of outputs. Typically, inputs are physical resources (raw materials and capital equipment) and labour; and output is either a physical commodity or a service.

There is no single relationship between the inputs and the output. The mix of inputs can be varied; for example, machinery may be substituted for labour or skilled labour substituted for unskilled labour. Thus, steel and labour are inputs to the manufacture of cars but, aluminium or even plastic can be substituted for steel. The car bodies may be painted by hand or by machine. Or the amount of input can be varied. Thus, production can be increased by increasing the number of people employed or the number of machines in operation. When a given level of input is used to produce a higher level of output, there is an increase in efficiency.

This simple model is illustrated in figure 1. The relationship between inputs and outputs is described as a production function.

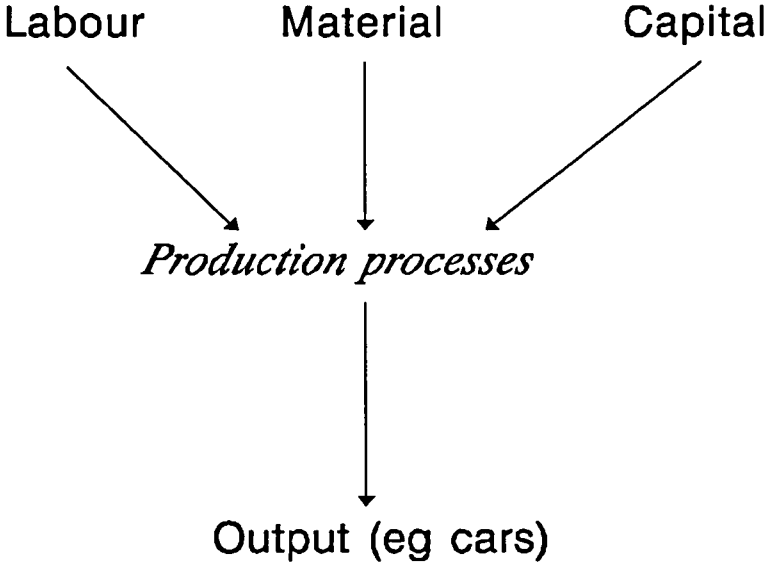
This model can also show how the output of one production process can be the input into another production function. Thus iron ore and fuel are inputs to the production of steel; and steel in turn is an input to the production of cars. In this case, steel is more correctly regarded as an intermediate output.

Finally, output ends up in the hands of consumers. They use the output not to pass on through another production process but for their own enjoyment and wellbeing; what in economics terminology is labelled 'welfare'.

This simple model can be applied to health (Evans and Stoddart 1990). First, consider the resources used in health care. These include the work time of doctors, nurses, and other health care workers, the equipment they use, and

the buildings they work in. These are combined to produce the output of the health care sector, and note the use of the word outputs here, not outcomes. Conceptually the outputs are episodes of care. For hospital inpatient services, a measure of output is the number of admissions described by case-mix produced in a given time. For community services, an appropriate measure may be completed episodes of care.

Figure 1



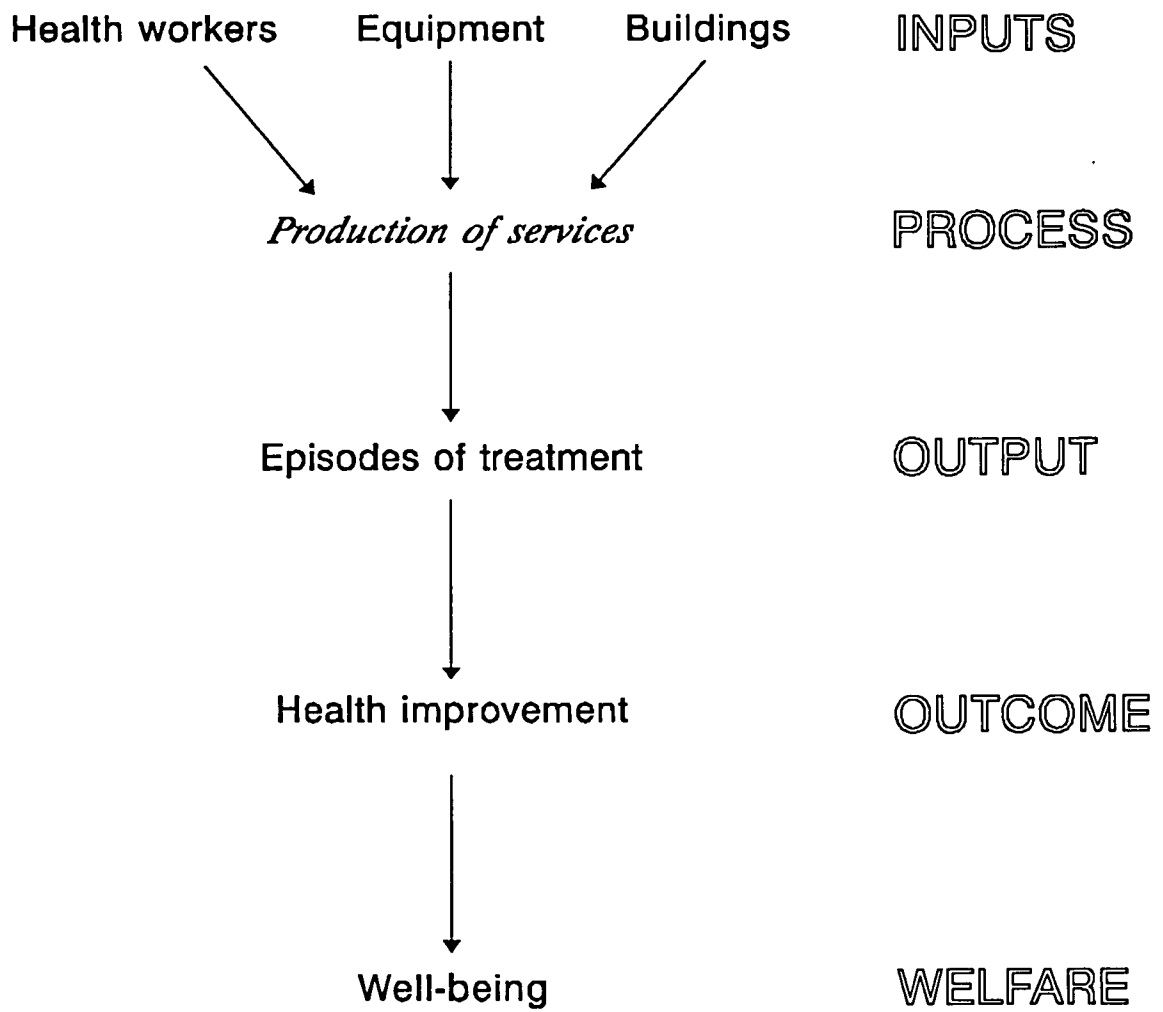


"Outcomes" is used to denote the change in what people value that comes from the health service output and that, in turn, improves their welfare. How does health care change consumer welfare? Here is where health care differs from most other commodities. Health care is rarely enjoyed for its own sake. Although it costs more to spend a week in a teaching hospital than in a five star hotel, there are no competitions which give a hospital stay as a prize. This is because most people, for the most part, seek health care when they are sick not because they enjoy being health care consumers but because they wish to be well. One's health status is an important part of one's overall wellbeing. Health care consumption (or use) contributes to one's welfare to the extent that it improves health.

The simple model of health outcomes is illustrated in figure 2. Resources are used as inputs in the production of health care; the outputs are valued not for the enjoyment of their consumption but for their contribution to health. (We return in section 5 to whether health care is the only input to health status and in section 6 to whether health status changes are the only outcomes of health care. The place of prevention and health promotion is also discussed in section 5).

This model explains the importance of seeing health care not in terms of the number of people passing through the system: that is an output. The outcome is what people value from health care use, which in turn increases their welfare.

Figure 2



### 3. Inputs and outputs.

Using the production function model helps us to see how outputs from one part of the health care system can be inputs to another part. At the level of the physiotherapy department in a hospital, labour and equipment are inputs, the number of physiotherapy treatments the output. At another level, physiotherapy treatment is an input into the hospital episode of care, say the admission of people with rheumatoid arthritis. Hospital beddays are sometimes considered an output but in this model they can be seen both as the output of the ward/hotel functions of the hospital and an input into the episode of care. At yet another level, one can define the hospital episode as an input, along with community care and rehabilitation, into the treatment of rheumatoid arthritis.

Health outcomes are explicitly focussed on consumers and the difference that health care services make to them. Maximising health outcomes means maximising consumer welfare gained from health care services. That in turn depends on the individual health gain multiplied by the number of people who gain <sup>1</sup> (see technical note 1).

The focus on outcomes requires planning problems to be defined in terms of the potential effects of health care. It requires an analysis of changes in health status due to health service use, not of the number of people put through the health services or waiting for treatment.

The relationship between inputs and outputs is still important, presumably if we could have greater health care outputs we could have a greater impact on health outcomes. If health care outputs are not contributing to health outcomes, the inputs used in that production should be switched to another production process to outputs that do affect outcomes.

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<sup>1</sup> An individual's welfare will increase if their health is improved. But one person's welfare may also be affected by another's health; directly if the other person is contagious; and indirectly if one person enjoys seeing another well.

### **Technical note 1: External effects**

The discussion so far has been concerned with health outcomes (and their value) to the individual consumer. But health care conveys benefits to people other than the specific consumer. Such **external effects** are readily incorporated conceptually in economics, though the practical implications are harder to deal with.

External effects in health care occur at three levels (Culyer 1976). First, I may benefit directly from your consumption of health care. For example, I benefit from any steps you take to avoid contracting and spreading an infectious disease. Second, I may feel better simply knowing that you have access to health care, whether or not you choose to use it. Third, I may feel better knowing that you are in better health. Thus, I gain benefit from your use of effective health services.

External effects are recognised as outcomes of the health care system though their measurement in practice is difficult.

#### 4. Doing better: the importance of costs.

Costs are the missing half of the outcomes framework as developed so far. Simply if resources were not limited, problems could be solved by providing more inputs.

The maximisation of health outcomes would mean doing everything for everybody that had even a small positive impact on their health. Pursuing this would mean spending a lot more than the 8% of our GDP currently spent on health care (Richardson 1990). What is important is not that we spend 8% GDP, but that to spend more would mean giving up other things, such as housing, education or entertainment. This is the notion of opportunity cost (note 2). Opportunity cost refers not to the dollar expenditures on these commodities but to the welfare forgone by using resources, ie the available inputs, in one production process rather than another. For example, it is the value of better schooling if additional resources are devoted to health care rather than education.

##### **Technical note 2: Opportunity cost**

The opportunity (or economic) cost of a health care program is equal in value to the outcomes of the most favoured alternative use of the same resources. It is not necessarily equal to the financial value of the resources expended on the program.

As an easy example, if there is an additional \$100,000 to be spent on one of two life saving projects, then the opportunity cost of the preferred program is equal in value to the lives which could have been saved if resources had been allocated instead to the alternative.

An economic evaluation is therefore a comparison of outcomes. It compares the outcomes achieved by one program with the outcomes which could be achieved by another were it to be provided with the same level of resourcing.

Resources are limited. Consequently using them one way means forgoing their use in another; and that in turn means forgoing one set of outputs in favour of an alternative. Choosing that set of outputs which makes the greatest contribution to welfare maximises what we get out of our limited resources.

In terms of the health production model, we are seeking to maximise the health gains within the limited resources available for health. This model also helps to distinguish the notion of technical efficiency from allocative efficiency (note 3).

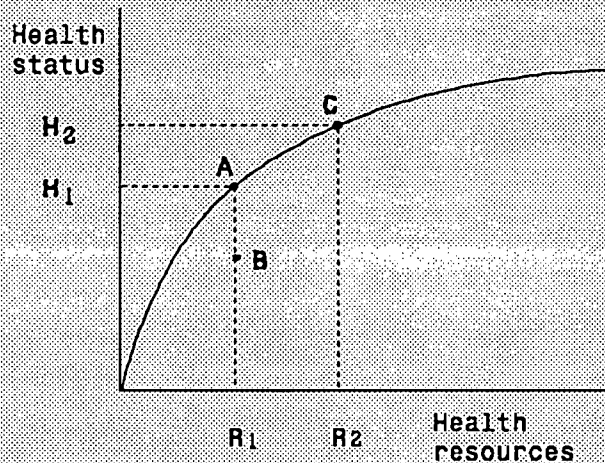
Technical efficiency describes the relationship between inputs and outputs. Technical efficiency is the maximisation of output from a given level of inputs. Becoming technically efficient does not reduce output - it does not require anything to be given up. It has no opportunity cost. Allocative efficiency is concerned with the mix of outputs. Should resources be moved from housing to health care, from education to defence? Allocative efficiency is the maximisation of welfare from a given level of inputs. Becoming allocatively efficient means changing output - forgoing one set of outcomes for another (Mooney 1992).

### Technical note 3: Economic efficiency

This relates to the relation between inputs and outputs or outcomes. A distinction is drawn between technical and allocative efficiency. The former relates to doing well whatever it is that one does. The latter relates to doing the right thing.

This can be seen in the figure (adapted from Evans 1984). The diagram shows the relationship between health status on the vertical axis and resources allocated to health care on the horizontal axis. The question of how health status should be measured is avoided here. The curve represents the maximum health produced for each level of input.

If a particular health program is being funded to the level  $R_1$ , then it should be achieving outcomes equal to  $H_1$ . This is point A on the diagram. If it is achieving anything less (point B), the service is technically inefficient. Reorganising work practices would allow better health outcomes to be achieved for the same level of resources. Any point below the curve is technically inefficient.



which point on the possible curve is the right point? Increased funding from  $R_1$  to  $R_2$  would increase health outcomes (from A to C) but at what cost? The opportunity cost is not simply the difference between  $R_1$  and  $R_2$ . Remembering that the additional resources could be spent either on this program or on another program, the opportunity cost is the forgone change in welfare from the most preferred alternative program. This is allocative efficiency.

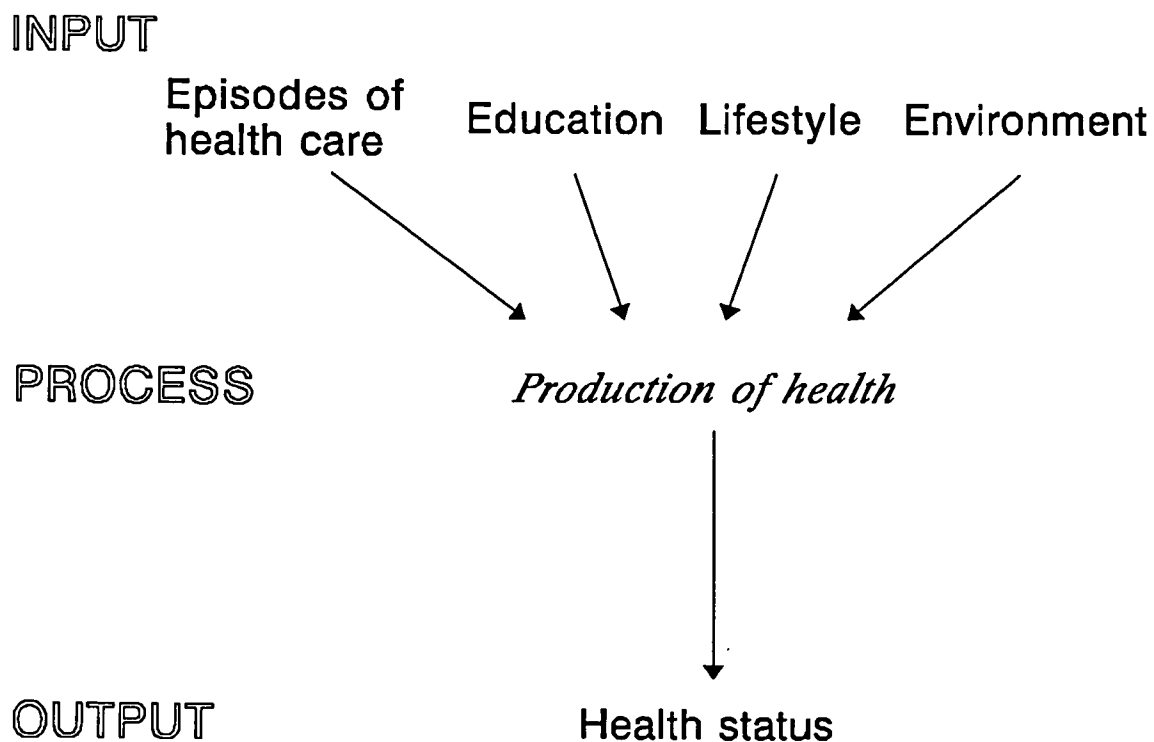
There is something else to note from this diagram. As the diagram is drawn, successive increases in resources yield positive benefits in terms of health status but at a diminishing rate. Thus, initially, the returns to health care expenditure are large (life saving treatments) but the returns get smaller as treatment is extended into the reduction of severe and then less severe morbidities. This is diminishing returns.

### 5. A more complex model: the production of health.

The simple model has described health care (in particular, treatment and curative services) as affecting health status. But health status is influenced by many things, including heredity, environment, lifestyle and luck.

The production of health can also be conceptualised in terms of a production model (note 4). Inputs of various types are combined by the individual (or the family) to produce good health. Health care is one such input; others are education, risk taking behaviours, health enhancing behaviours, and environmental factors. This is illustrated in figure 3. Here, health status is seen as the output of the production model. In contrast, in the health care production model developed earlier, it was episodes of care that were designated as output. This model shows that changing lifestyles could be more efficient than using more health care in producing more health.

Figure 3





#### Technical note 4: Household Production

The concept of the production function has been extended to the individual (or household as the traditional unit of economic analysis). Here, in order to maximise his or her own health state, the individual incorporates various inputs; health care, education, lifestyle changes etc, in order to 'produce' a level of health. In this model, the individual's genetic make up determines the production function, in that it constrains the individual's ability to transform inputs into health outcomes. It is analogous to the state of technology in physical production processes.

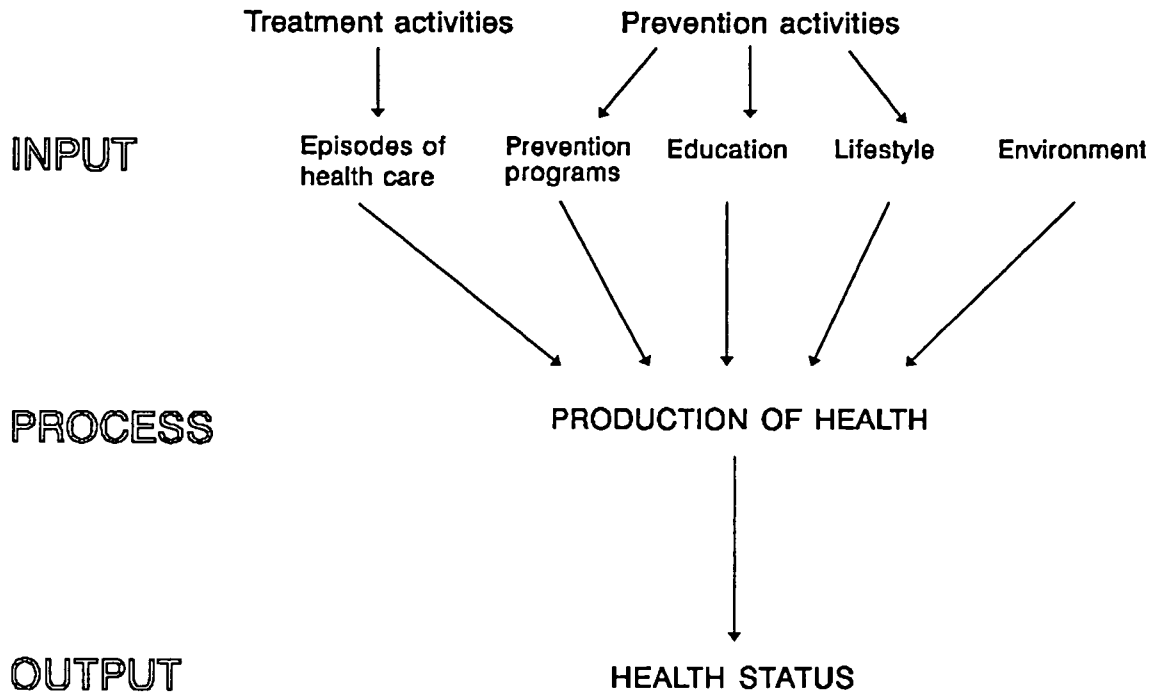
This approach has been taken to its extreme by Grossman (1972) whose model of the demand for health allows one to predict one's optimum life span! However, the notion of household production is important not for its predictive capacity but for its conceptual insights. It shows clearly that health care is not the only determinant of good health and that good health is not the only source of well-being. Households produce not only their own health, but also wealth, leisure activities, housing and so on. Households must trade-off health with other sources of satisfaction. This model can be used to explain many 'unhealthy' choices. For example, Graham's study of the smoking habits of single mothers showed that many felt they could not cope with their child-minding responsibilities without the support of tobacco (Graham 1987). These individuals judged the loss of welfare in giving up cigarettes to be greater than the welfare value of the potential health benefits.

The implications of this, for example, for health promotion programs, is that if they are to succeed, they must not only change the information available to individuals but also change the incentives which they face in order to make health promoting behavioural change in the best interests of those concerned (Birch and Stoddart 1989).

What of prevention? In terms of this model, prevention can work in two ways; directly or indirectly. Direct prevention programs include immunisation and cervical cancer screening which have a direct affect on the production of health. Indirect programs focus 'upstream' to produce better health either by changing individuals' knowledge and behaviour or by changing the environment in which they make choices about their lifestyle "making healthy choices easy choices" (McKinlay 1979). Examples of the former include healthy diet programs and stop smoking programs. Examples of the latter include improved food

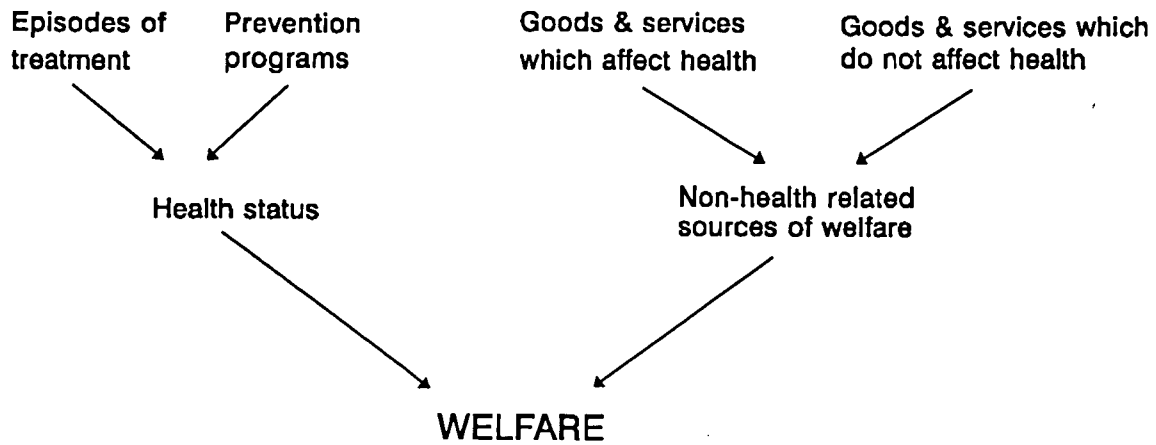
availability or quality, improved motor vehicle design, and surveillance of air conditioning systems (figure 4).

Figure 4



Health outcomes have already been described as changes in consumer welfare resulting from health care consumption. Good health is desirable, so consumer welfare will be higher with better health, other things being equal. However, good health is not the only desirable end and an individual's welfare or well-being is influenced by many other factors (figure 5).

Figure 5



It is obvious from people's behaviour, when they smoke, over-eat, or indulge in sporting activities, that individuals are prepared to trade health for other sources of satisfaction. Maximisation of health is not a goal shared by many individuals.

## 6. Are health gains the only outcomes?

The demand for health care arises not because the use of health care services is enjoyable but because it leads to improvements in health. But health gains are not the only benefits of health care consumption. There are other characteristics of health care which affect consumer welfare. Therefore, health gains are not the only relevant health outcomes. Two of these other factors are information and satisfaction with the process or quality of service delivery.

Typically, health care consumers are not well informed either about their own health state or the effectiveness of health care. Individuals who are not medically trained cannot interpret their own symptoms - they need to visit the doctor to find out if they need a doctor! Hence information itself may be an important output of health care (Mooney 1992, Evans 1984, McGuire et al 1988).

Once individuals have a diagnosis, they do not know, typically, what treatment will be effective. Therefore they are unable to judge the value of health care in producing health. They must rely on their doctor's advice about treatment and its effectiveness. To use our earlier analogy, individuals can judge how much a car will contribute to their welfare because they know how much they value transport, comfort and status symbolism although they do not have the technical information about how a car is made. But they cannot judge so easily how health care will affect their welfare.

The process of production of health care is also important. Typically, production processes are treated as 'black boxes' by economists because the performance of an industry or firm can be judged simply by the ratio of output to input or income to costs. But health care is a service and production cannot be separated from consumption. Unlike inanimate raw materials, which have no preferences about how they are transformed from inputs to outputs, consumers are not indifferent to whether they are treated with dignity and compassion.

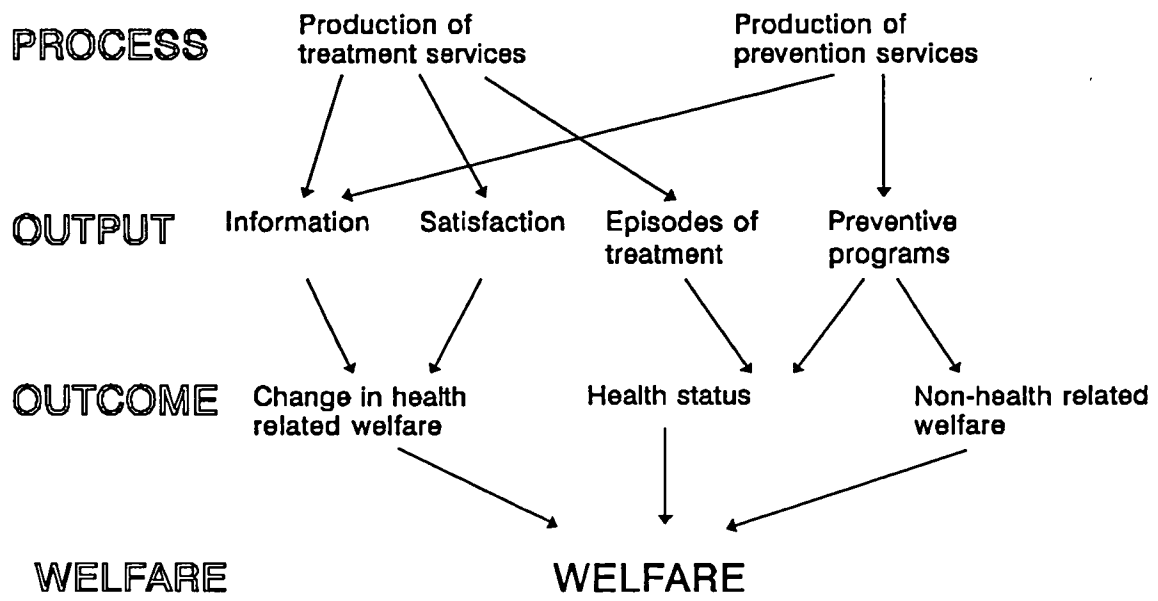
Therefore, independent of the effects on health status, the process of care is also important in contributing to welfare.

The output of prevention is more difficult to observe than the output of treatment. Typically preventive activities are aimed at health improvements or maintenance in the long term and the 'improvement' may not be a gain in health status but the avoidance or minimisation of deterioration in health. Thus, improvement is defined relative to what would have been the case in the absence of the preventive program.

Is the output of health promotion more than health status gains? We would argue probably yes. Information about health and risks to health may be valued even if it does not change behaviour. Participation in health promotion programs may be enjoyable apart from any health status changes. The outputs and outcomes of treatment and prevention are summarised diagrammatically in figure 6.

Therefore, to categorise the outcomes of health care, including prevention, as only health gains is a very narrow view. The provision of information and satisfaction with the process of health care are also relevant to consumer welfare and hence should be regarded as part of the conceptual framework of health outcomes.

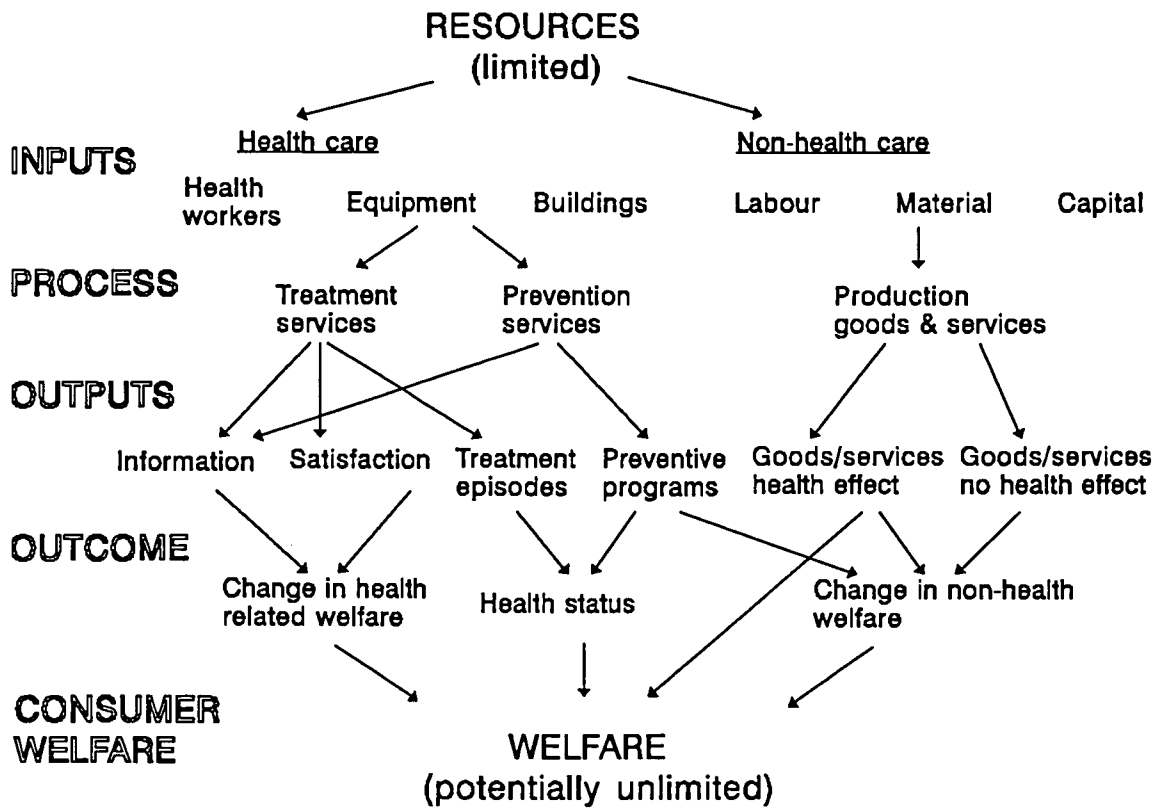
Figure 6



## 7. Conclusion.

The production model applied to health care and to health is summarised in figure 7. The model could be further extended and made more complex but the purpose of such model building is to reduce complexity while explaining. This model helps to clarify the concept and meaning of health outcomes.

Figure 7



First, it identifies that the objective is to improve human welfare. Health status is an important component of welfare but not the only one.

Second, it recognises that resources are limited compared to an unlimited potential to improve welfare. Therefore, the problem is to maximise welfare within scarce limited resources. Both outcomes and their opportunity costs are important.

Third, resources are used as inputs to the production of health care. Health care, in turn, is an input to the production of health; and therefore health care is valued for its contribution to health.

Fourth, there are other inputs to the production of health, besides health care. These include prevention and health promotion as well as education, housing, nutrition, and the environment.

Fifth, it recognises that there might be other outcomes from health care besides health gains; for example information and satisfaction with the process of care.

A successful re-orientation of the health care system away from its current focus on inputs and throughputs towards health outcomes would represent a radical change in the way health services are perceived by the managers responsible for their delivery. Though desirable, there is a danger, because of the size of the task and the confusion about what health outcomes actually are, that we lose sight of the final objective. Conceptualising health outcomes within the economic framework described in this paper provides the clarity needed to promote health outcomes and thus improve the effectiveness of the health services.



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