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The Economics of Health Care

Welcome to the Office of Health Economics' interactive e-source 'The Economics of Health Care'. It is aimed at post-16 students of economic courses, although it contains much that should also be of interest to anyone wishing to understand the basic principles of health care economics.

This e-source represents the third edition of 'The Economics of Health Care'. The second edition, launched in 1999, has been fully updated and extended.

This e-source is split into five units, which are shown on the left. In these units, we will show how economists have approached the problem of health care. This involves introducing and explaining the economic theory which underpins health economists' analysis. Much of this theory will look familiar to economics students - scarcity, supply & demand and market failure. But this is not just classroom theory - this is theory applied to actual problems leading to concrete policies. This e-source should bring this textbook theory to life and it will give you a much deeper understanding of the kind of problems and challenges that the modern health service faces.

There is also an appendix with six sets of data which are relevant to this e-source and will interest students and teachers.

Foreword

The future of health care and the state of the National Health Service are daily news items. Discussion of health care arouses great passion - who gets health care and how much they get is both a moral and practical challenge to a civilised society and of personal interest to us all. We don't want to get ill and we want to be properly treated if we do. Economics as a discipline can provide great insight into these issues. The fundamental problem of scarcity requires choices. Even if our preference is to spend more on health care, there are limits as to how much of our national income we can spend on its provision. However much we do decide to spend, we want to spend it efficiently so that we get more health care for a given commitment of resources.

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1. The problems of health care

Health care is something which touches all of our lives. Everybody visits the doctor and dentist and many of us have been treated in hospital. The future of the National Health Service (NHS) consistently surfaces as one of the most important issues which people believe is facing Britain today.

Yet health care seems to be in almost permanent crisis – there are shortages of hospital beds and patients are left to lie in corridors while politicians argue endlessly over whether more or less is being spent on the NHS. Why is it that health care is such a controversial area? Why is there never enough money to give us the level of health care we want?
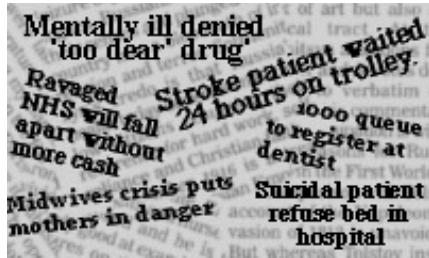
To answer these questions we need to introduce and apply a range of economic concepts. Each of the sections listed on the left develops part of the answer.

i. Approaching the problems

How can we resolve the kind of dilemmas expressed in these headlines?

Asking people what they think

This is the approach Ann Bowling of the King's Fund took. She set out to discover what 'ordinary people' thought should be the health service priorities by conducting a detailed survey of the residents of a part of London. Below are some responses taken from the survey.

* "I think life saving treatments for children are most important. We've had our time now"
* "If a child is really unable to survive it really does seem a bit naive to plough a lot of money into it"
* "If people don't lead healthy lives why should the health authority waste money on making them aware"
* "The most important thing is to cure people who have life threatening illness and then help people to lead a good life"
* "Instead of curing it prevent it. There's no guarantee that you can cure someone so it is better to prevent illness"
* "Care of the dying is most important - why should people suffer?"

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Many economists would argue that the problem with these responses is that they mix up opinions and value judgements with facts. Economists believe that it is important to distinguish questions of fact from value judgements and opinions.

Fact or opinion?

A statement such as "Specialist in heart-lung transplants resigns from the NHS in protest at lack of funding" is a positive statement: it can be shown to be true or false and is not dependent upon the value system of the observer. In contrast, "Health care is a basic right and should be provided free" is a normative statement. It cannot be proved true or false: our view of it depends on our value system. One of the things which makes the debate over the provision of health care difficult to resolve is that positive and normative issues are very much intertwined. Sorting out fact from opinion is a first step but it does not explain why there are not enough beds in hospitals or why people might be refused treatment. To analyse this we need to explore the idea of scarcity.

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ii. Scarcity - the health care dimension

It is estimated that by 2031 the over 65s will be 23% of the UK population.

	1948	1999
Number of elderly people in the UK in millions (defined as aged 65 and over)	5.3	9.3
As % of population	10.7	15.6

If you visit your doctor (general practitioner, GP) you will go to the surgery (land and capital), have your appointment verified by the receptionist (labour), be examined by the doctor (enterprise and labour) who might use a stethoscope (capital) to listen to your chest before prescribing a course of antibiotics (land, labour, capital and enterprise) to treat your chest infection.

Scarcity has two sides: the infinite nature of human wants and the finite or limited nature of resources available to produce goods and services. What does this mean when related to health care? We'll examine the wants first.

The wants

Why do people demand health care? The simple answer is that they want to be healthy. This desire to remain healthy has led to a continuous growth in the demand for health care. However, there are also a number of specific reasons why the demand for health care has expanded so dramatically in developed countries over the last 40 years:

Changes in the age structure
Increasing real incomes
Improvements in medical technology

Let's look at these in more detail.

Changes in age structure
Changes in the age structure of the population have increased the demand for health care. Countries like the UK have an ageing population.

Elderly people require more health care than other age groups. For instance, in 1998/99, 39% of NHS hospital and community health services expenditure was used for treating people aged 65 and over, even though they are only 16% of the total population. Only 11% of the population were 65 or older when the NHS was founded in 1948.

Increasing real incomes
Increasing real incomes have led to an increase in people's expectations of health care. Many of us are now not prepared to put up with the pain, discomfort and lack of mobility associated with afflictions like severe osteoarthritis of the hip - we demand a hip replacement operation. In the USA, people suffering from mild osteoarthritis of the knee often have an operation rather than give up playing golf.

Improvements in medical technology
Improvements in medical technology have continuously increased the range of treatments possible. A good example of this is the way in which the development of kidney dialysis machines has largely prevented kidney failure from killing people. As well as

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new and more effective medicines allowing us to treat conditions which were previously incurable, many new treatments now make chronic diseases like asthma manageable for patients, enabling them to have a good quality of life.

The resources

The other side of the scarcity equation relates to the finite nature of resources. The term 'resources' covers all inputs used to produce goods and services. Economists also refer to these as the factors of production. They are divided into four categories:

1.   land - the physical resources of the planet including mineral deposits
2.   labour - human resources in the sense of people as workers
3.   capital - resources created by humans to aid production, such as tools, machinery and factories
4.   enterprise - the human resource of organising the other three factors to produce goods and services.

We can see all four factors at work in the production of health care

It is fairly obvious that the available quantity of these factors is limited, therefore there is some maximum quantity of health care that can be produced at any one time. We can explore this idea theoretically by using what economists call a Production Possibility Frontier (PPF).

iii. Scarcity - a theoretical approach

Heart bypass surgery is about to start.

Scarcity has two sides: the infinite nature of human wants and the finite or limited nature of resources available to produce goods and services. We can explore this idea theoretically by using what economists call a Production Possibility Frontier (PPF).

PPFs in health care

Let us start by looking at the production of health care within a single hospital and in particular at the ability of a specific hospital unit to carry out surgical procedures such as heart bypass operations. Suppose the heart bypass unit has 10 surgeons working in it, and assume that the only factor which affects the quantity of operations provided is the number of surgeons assigned to them.

If all the surgeons are assigned to heart bypass operations then the unit can carry out 50 heart operations per week. If, on the other hand, all the surgeons are assigned to other operations, then the unit can carry out 50 of these other operations per week. Figure 1 shows the production possibility frontier for this unit. The graph charts all the possible maximum combinations of operations that the unit can achieve given the quantity and productivity of resources available.
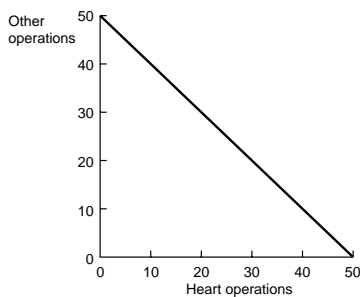
The shape of the graph

What determines the shape of the graph? Look at the graph on the left (Figure 1). It is a straight line, with a gradient of -1. This reflects the fact that if we transfer one surgeon to heart bypass from other operations, we get five more heart bypasses but we lose five of the other operations, i.e. the trade-off between the two possibilities is one to one. This is what is called the marginal rate of transformation, MRT.

In fact it is highly unlikely that the marginal rate of transformation would be constant. The surgeons carrying out heart bypass operations would be working with a fixed quantity of operating theatres, heart monitors, and other inputs. So the more surgeons carrying out bypass operations, the less equipment each one would have. Therefore, the output per surgeon would fall.

So, the number of additional bypass operations carried out by an extra surgeon is different depending on how many surgeons are already doing bypasses. If there are already a lot of surgeons doing bypass operations, the extra one creates only a small

Figure 1

increase in the number of bypass operations. This bends the line downwards, making it concave. This increase is smaller than if there were only a few surgeons already doing bypass operations.

This phenomenon is called the Law of Diminishing Returns and makes the PPF concave to the origin (like Figure 2).

Efficiency

Now look at point A in Figure 2. It corresponds to 14 bypass operations combined with 10 other operations. This lies within the PPF in this case (the curve passing through points B and C). Clearly this is a possible combination in the sense that the hospital has enough resources to achieve it, but is it an efficient combination? What do we mean by efficient?

The definition of efficiency used by economists is named after the Italian economist, Vilfredo Pareto, who formulated it. He said that an allocation of resources is efficient if it is impossible to change that allocation to make one person better off without making someone else worse off. Look at combination A again. Obviously it would be possible to re-organise the hospital's resources to increase the number of other operations without having to reduce the number of heart operations. This is shown by point B on the diagram. Moving from combination A to combination B is clearly in society's interests: we are getting an extra four other operations, i.e. more medical care from our scarce resources.

Opportunity cost

In fact at point B we are getting a maximum combination possible, given the resources we have. It is a Pareto efficient allocation. If we choose to move from combination B to combination C, then although we are getting five more bypass operations this has been at the expense of nine other operations. Thus moving from combination B to C involves a cost, which economists call an opportunity cost. Formally, this is defined as the benefit given up by not choosing the next best alternative. In this case the opportunity cost of moving from point B to C is nine other operations. All combinations which lie on a PPF are, by definition, pareto efficient.
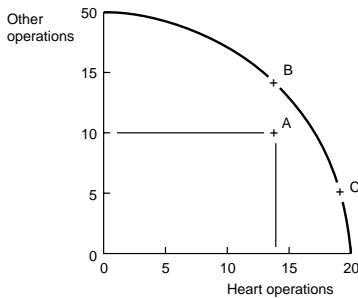

Figure 2

Getting more treatment

There are only two ways that society can get more treatment:

A.	By improving the productivity of the factors of production, so that the same quantity of factors produces more treatments. For example, Figure 2 showed surgeons being able to produce either 20 heart bypass or 20 other operations. Increased productivity of surgeons carrying out heart bypasses results in the PPF pivoting outwards, e.g. to 28 heart bypasses or 20 other operations as in Figure 3a.
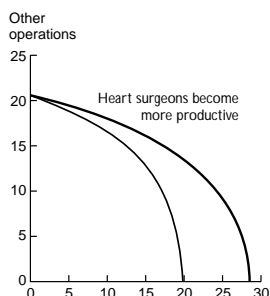
B.	By increasing the quantity of the factors of production. The initial position is again 20 heart bypass or 20 other operations. When more surgeons are allocated to all operations then the PPF shifts outwards, e.g. to 24 heart bypass or 24 other operations as in Figure 3b.
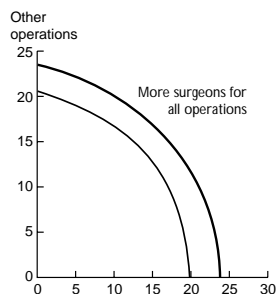
Figure 3a

Figure 3b

Figure 4

The cost of more treatment

The PPFs we have been using relate to choices between different types of health care. But we can equally use PPF analysis to illustrate the trade-off between health care and all other goods. Such a PPF is shown in Figure 4.

It is unlikely that society would choose either point A or B, but they and all points between are feasible. The question is how does society decide between them.

iv. Trade-offs

Allocation of health care

Given scarcity, what we need is an allocation or decision making system to determine how much of which kinds of health care is provided. There are three possibilities: the free market; the command system; and the mixed system.
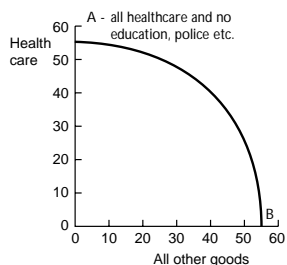
The free market would allocate health care resources according to consumers' purchasing behaviour, while the command model would use planning to allocate health care according to some predetermined criterion such as 'need.' The mixed system would combine parts of the free market with elements of the command model.

Efficiency

How can society decide which of these systems is most suitable in any given case? There are two criteria that economists use to assess the performance of an allocation system. The first is efficiency: does the system produce an allocation which is Pareto efficient (and thus on the economy's PPF). If the allocation is efficient then the economy is producing exactly the quantity and type of health care that society wants (allocative efficiency) and it is producing that health care for the lowest possible cost (productive efficiency).

Equity

The second criterion is equity: does the system produce an allocation which meets society's requirement for justice? Clearly, this is a normative issue: the decision made depends upon people's values. However, it is a very important consideration for many people when they consider the allocation of health care. It is possible to argue, for instance, that notions of social justice were the single most important influence on the setting up of the National Health Service in the UK.

Equity is a difficult concept to analyse but it helps if we differentiate between horizontal and vertical equity. Horizontal equity is concerned with the equal treatment of equal need. This means that to be horizontally equitable, the health care allocation system must treat two individuals with the same complaint in an identical way. Vertical equity, on the other hand, is concerned with the extent to which individuals who are unequal should be treated differently. In health care it can be reflected by the aim of unequal treatment for unequal need, i.e. more treatment for those with serious conditions than for those with trivial complaints, or by basing the financing of health care on ability to pay, e.g. via progressive income tax.

v. Using the theory

A unique hospital unit for children with severe learning disabilities and extreme behaviour problems faces closure so that much of its £350,000 annual budget can be diverted to run a scanner in another department.

Article from The Guardian 8/1/92.

Is this the result of not enough resources or does it just reflect the transfer of resources to a more efficient use?

What has the economic analysis in the previous pages added to our understanding of health care problems? Take the newspaper report on the left. What can we say about this?

Firstly, the statement is positive and so capable of being analysed objectively.

Secondly, the conflict has been partly brought about by the effects of developing medical technology - without the development of the scanner we would not have had the conflict.

Lastly, PPF analysis makes it clear that this situation reflects one of two possibilities. Either the hospital is operating on its frontier, or it is operating at some point inside its frontier. In the first case, either we have to find some way of deciding between the two efficient allocations (scanner versus children's unit) or we have to devote more resources to medical care in this hospital (shift the PPF outwards). In the second case, since the initial allocation was inefficient, there may be no need to choose between the two possibilities. If we just remove the inefficiencies we may then have enough resources to have both the scanner and the children's unit.

Debate on the NHS

This may seem rather simplistic but it does relate directly to the debate about changes in the NHS. The government has tended to argue that existing allocations have been inefficient, so that it is possible to get more from existing resources. Critics of their policy have argued on the other hand that the problem is a lack of resources.

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vi. Case study - Child B

Condemned by bank balance

What state is this country in when a girl's right to life hinges on the size of a hospital bank balance?
The Sun 11.3.1995

A price too high to pay

Money is everything in health care today. A child's life now is worth only what a health authority's accountants are willing to pay for it   Daily Mirror 11.3.1995
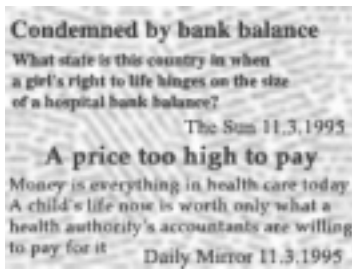
Health care rationing hit the headlines in March 1995 with the case of Child B. Some of the newspaper headlines are shown on the left.

The case

Child B, or Jaymee Bowen as she was later revealed to be, was suffering from leukaemia. She developed acute lymphoblastic leukaemia when she was five and received a bone marrow transplant. She appeared to recover but in January 1995, when she was 10 she was diagnosed as suffering from acute myeloid leukaemia. NHS consultants at both Addenbrookes and the Royal Marsden hospitals said that she had only about eight weeks to live and that the only possible treatment, intensive chemotherapy and a second bone marrow transplant, was very unlikely to succeed, unpleasant and not in her best interests.

Her father refused to accept this and sought opinions from other doctors in Britain and the United States. He found a consultant in London who was prepared to treat his daughter in the private sector, but Cambridge and Huntingdon Health Authority refused to grant the £75,000 needed for the treatment. Jaymee Bowen's father challenged this refusal in the High Court. The Court ruled that health authority should reconsider its decision but this was immediately overturned on appeal.

The case attracted much publicity and an anonymous private benefactor paid for the treatment Jaymee's father wanted her to have. Intensive chemotherapy met with only limited success and so the consultant decided to treat Jaymee Bowen with an experimental treatment, donor lymphocyte infusion. Jaymee went into remission and survived longer than the experts had expected. However, in May 1996 she died.

Newspaper response

This case demonstrated how difficult it can be to make rational, reasoned choices - particularly when the media become involved. There was an enormous amount of media attention - with 149 articles being published over the six day period of the case. Many articles suggested that NHS funds were wasted on less worthy uses - funds which could have been used to treat Jaymee Bowen. Examples of less worthy uses of NHS funds cited by the papers included administration, managers' cars, abortions, cosmetic surgery, sex change operations and health education 'propaganda'.

For a number of papers the case provided evidence of rationing 'creeping into the NHS'. For instance "The case has brought into sharp and public focus the simple, central truth of modern state-provided medicine. The National Health Service cannot possibly afford what is now medically possible" The Independent 11.3.1995 and "These latest examples raise fears that rationing of life saving resources is not just creeping into the NHS but is already entrenched" The Daily Telegraph 11.3.1995.

Analysis

Entwistle, Watt, Bradbury and Pehl, reviewing this media coverage, are concerned by "their selective presentations". They conclude "Decisions about the treatment of seriously ill children and the rationing of health care are both complex and emotive....Publicity brought the case and some of the issues it raised into the open, but it did not necessarily leave people well informed. In particular, the question of whether the treatment was in the child's best interest was relatively neglected. Child B became "the girl refused treatment on the NHS" ...The current climate...means that even cases that are primarily about clinical effectiveness and a patient's best interests come to be seen as examples of rationing."

Conclusion

This case raises many questions, some of which have been touched on in this unit. However, you also should look at Unit 2 for a free market perspective and Unit 3 for some thoughts on whether individuals can decide what is in their own best interest.

The Child B case was seen by many as an example of health care rationing. How could such rationing be organised? Look at 'Approaches to rationing' on the next page for some thoughts on this.

vii. Approaches to rationing

It has been increasingly accepted at both local and national level in the UK that rationing is inevitable in the NHS. This has led to initiatives to explore the best way of making such decisions. One approach has been to use surveys of randomly sampled adults. One such survey carried out in Great Britain in 1995/6 generated a 75% response rate and most of the people surveyed thought that surveys like this should be used in the planning of health services. The list below shows how this sample thought health care services should be prioritised.

Priority rating of health services

1. Treatments for children with life-threatening illnesses
2. Special care and pain relief for people who are dying
3. Preventive screening services and immunisations
4. Surgery such as hip replacements to help people carry out everyday tasks
5. District nursing and community services/care at home
6. Psychiatric services for people with mental illnesses
7. High technology surgery, organ transplants and procedures which treat life threatening conditions
8. Health promotion / education services to help people lead healthy lives
9. Intensive care for premature babies who weigh less than 680g with only a slight chance of survival
10. Long stay hospital care for elderly people
11. Treatment for infertility
12. Treatment for people aged 75 and over with life threatening illness

Citizens' juries

The case of Jaymee Bowen (Child B) outlined in the previous section, made the issue of health care rationing in the UK headline news. Cambridge and Huntingdon Health Authority responded to this 'trial by tabloid' by setting up a citizens' jury to help decide health care prioritisation. Sixteen 'jurors' sat for four days hearing advice from expert witnesses. They were asked to consider how priorities for health care should be set, according to what criteria and to what extent the public should be involved. Most thought that there should be an element of public involvement in developing rationing guidelines, but only alongside other interests. Nobody voted for the involvement of politicians in a national council for priority setting.

One option is to 'let the market decide'. This is explored in Unit 2 'The free market approach to health care'.

viii. Questions and activities

Questions

1. Look at the following statements and see if you can decide whether they are positive or normative:

A.   Junior doctors ought not to work up to 80 hours a week
B.   The long hours junior doctors work do not interfere with their ability to provide effective medical treatment
C.   The waiting times for routine surgery are shorter for private patients than for NHS patients
D.   NHS doctors should not be allowed to treat patients privately
E.   A hip replacement is not a life-saving operation
F.   Hip replacements should not be provided by the NHS.

2. Why do you think that economists believe that it is important to distinguish between positive and normative statements? Do you think it is possible to ever be completely positive?

Activities

A1. Set up a survey to try to discover which health care priorities people in your school or college think are most important. You could do this by interviewing a sample of students or you could construct a questionnaire.

A2. Research how demand for health care has changed in your area. Your local library should have information about the health care services available. Try to answer the following questions. Has the number of old people changed significantly in the last 10 years? What about new treatments - does your doctor offer stress counselling for instance? Has your local hospital introduced new equipment such as body scanners?

Questions

3. a) The graph in Figure 5 on the left shows a PPF. Identify the following combinations:

A.   60 bypass and 19 other operations;
B.   15 bypass and 54 other operations;
C.   40 bypass and 40 other operations;
D.   40 bypass and 58 other operations.

b) Which of these are feasible and which are efficient?

4. Why is it unlikely that society will choose either combination E or F in Figure 5?
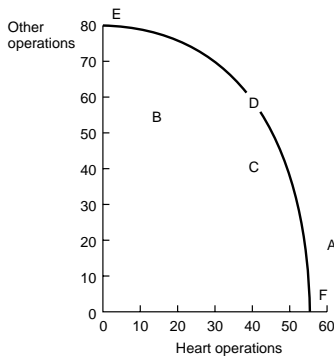
Figure 5

Activity

A3. Many hospitals have been reduced in size or closed down. Research why this happened. Try to relate it to changes in the trade-off between hospitals and other forms of health care.

Questions

5. Which do you think is more important - that we treat all patients with kidney failure in the same way or that we make sure that we devote more health care resources to kidney failure than to plastic surgery? Justify your answer.

6. Do you think that the rich should contribute more to the financing of health care than the poor? Justify your answer.

Type in your answers, then click here to compare your answer with our guide answer.

2. The free market approach

One way in which the problem of scarcity can be overcome is to let people buy the health care they want. This is what happens with most cosmetic surgery. "A man can have a facelift, a nose correction and his eyes tightened up. His whole face can be rebuilt for a third of the cost of the front end of an expensive car respray" - The Guardian 7.6.91

All these treatments and more are available if you want to buy them and have the money to pay for them. This kind of health care is sold just like any consumer good. People buy the treatment because they gain satisfaction from it, in just the same way that they would gain satisfaction from a car or a new dress. As consultant plastic surgeon David Sharpe puts it "There's nothing wrong with having plastic surgery, even if you don't need it. It's like buying a Porsche. You don't need one. It just makes you feel better".

The market for cosmetic surgery shows that it is possible to buy and sell health care. To understand how such a market might work as a resource allocation system, we need to look at the different elements involved in any market. Look at 'What is a market' to see what these elements are. Even if a market can work for cosmetic surgery what about the rest of health care? Look at 'Health care - case for a free market' for some views on this.

i. What is a market?

Overview

For many people the word market conjures up a picture of a town square with lots of small stall holders selling everything from fruit and vegetables to meat and fish. For economists, the term has a much wider meaning. It is used to describe any process of exchange between buyers and sellers. Formally, a market can be defined as any set of arrangements which allows buyers and sellers to communicate and thus arrange exchange of goods, services or resources. A free market is where such exchange occurs without interference from the government. Information is a vital ingredient for any market. Both buyers and sellers need to have access to sufficient information to allow them to make rational decisions.

Who are the buyers and sellers?

So a market for health care must involve two groups: the buyers and the sellers, who interact to trade health care. Who would the buyers and sellers be in such a market? We all want good health and so most of us would be prepared, if necessary, to purchase medical treatment to cure an illness. This suggests that everybody is potentially a buyer (or consumer) of health care. More precisely, at any moment, a buyer would be anybody who was ill or who wanted preventative medical treatment such as a vaccination or who wanted guidance about their health. The sellers would be those people who could provide medical and health care services, such as doctors, nurses, physiotherapists, dentists and high street chemists.

In the UK osteopathy provides an example of a health care market which corresponds quite closely to the textbook model of a market.

Osteopaths manipulate and massage bones, muscles and ligaments which have been twisted or strained in some way. Increasingly, they specialise in dealing with the kind of sprains and strains that people get from sporting activities.

Until 1993, anybody could set up as an osteopath and advertise their services. Osteopaths operated outside the NHS selling their services directly to consumers. Osteopaths either worked individually or in small practices and they all sold a very similar service. In the next three sections we use the example of osteopathy to look at demand then supply and then put the buyers and sellers together to look at the market for osteopathy.

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a. Demand - analysing the buyers' behaviour

Osteopaths manipulate and massage bones, muscles and ligaments that have been twisted or strained.

What will influence how much osteopathy people are prepared to buy at any particular time?

Substitution and income effects

Perhaps the most important factor will be the price of the treatment. The more expensive it is to buy osteopathy, all other factors remaining constant, the less we will buy. Why?

When osteopathy becomes more expensive two things happen:

1.   relative prices change; and
2.   our real income changes.

When we react to the price rise, we are taking both of these changes into account. The change in relative price means that osteopathy is now more expensive compared to other goods and services. How do we respond to this? Economists assume that people are satisfaction maximisers. This means that we all try to gain as much satisfaction as possible from our consumption of goods and services. So we react to the fact that osteopathy is now relatively more expensive by choosing to buy less of it and more of something else instead (substitution effect).

The increase in the price of osteopathy has also reduced our real income - we can now buy less than before with our money income. The way which we react to this change in real income depends on the kind of good or service. Osteopathy, like most goods, is a normal good - an increase in income leads to an increase in demand and vice versa. So a fall in real income will further reduce the amount of treatment bought (income effect).

The demand curve

This predictable relationship between price and quantity demanded allows us to define demand formally as the quantity of a good or service that buyers are willing and able to buy at every conceivable price. The demand curve (see Figure 6a on the left) shows this relationship graphically.

Figure 6a

DD shows the quantity of osteopathy treatments that consumers are prepared to buy at every conceivable price. A change in price leads to a movement along the demand curve. When the price is P consumers will buy Q. If the price falls to P' then the quantity demanded will rise to Q'. A change in price has led to a movement along the demand curve.
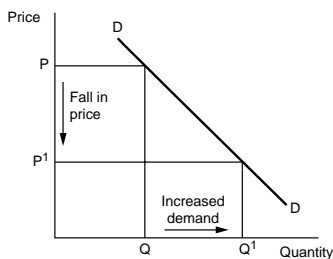
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Figure 6b
Demand curves shifts inwards
from DD to $D^1 D^1$ as a result of:
a fall in income
a fall in preferences
a fall in price of substitute
a rise in price of complement
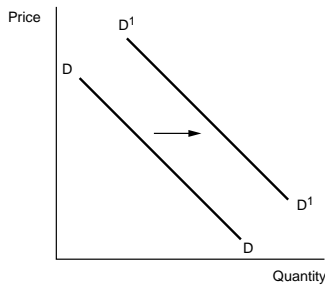
Figure 6c
Demand curve shifts outwards
from DD to $D^1 D^1$ as a result of:
a rise in income
an increase in preferences
a rise in price of substitute
a fall in price of complement

What else will influence how much osteopathy we buy? The answer is our income, our preferences and the prices of other goods.

Osteopathy is a normal good so if our income rises we will buy more treatment at each price, and if it falls we will buy less.

If our preferences change, we will buy more or less osteopathy at each price. If we decide we are keen on osteopathy, then we will buy more of it. If we go off the idea of osteopathy, then the amount we buy will drop.

Our demand for osteopathy will also be affected by the prices of related services. An obvious example is the price of physiotherapy, which is an alternative (or substitute) treatment for many of the conditions treated by osteopaths. If the price of physiotherapy falls then some people are likely to switch from osteopathy to physiotherapy, so the demand for osteopathy would fall.

Our demand for goods and services is also affected by changes in prices of complementary goods. These are goods and services which tend to be bought together. For instance, if the price of eye tests rose significantly, then many people would not bother to get their eyes checked regularly. This would lead to a fall in the demand for spectacles.

Whenever income, preferences or the price of a related good or service changes, the demand curve shifts. You can try out the effects of changes in the graph on the left.
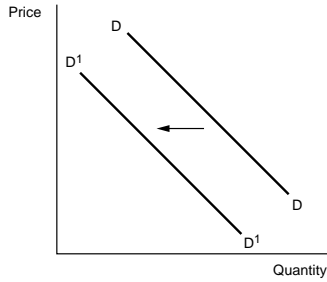
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b. Supply - analysing the sellers' behaviour

The sellers in this market are the osteopaths we described earlier. We assume that these osteopaths want to maximise their profits. What are profits and how can they be maximised? Osteopaths earn money (revenue) by selling their services e.g. by massaging away muscular strains. Out of this revenue they need to pay for the factors they use to produce the treatment (costs) e.g. pay their receptionist, pay the rent or pay for a new ultrasound machine. Profit is the excess of revenue over costs.

Figure 7. The supply curve for osteopathy treatments.

Maximising profits

Seeking to maximise profits leads each osteopath to want to sell more care at higher prices. There is a reliable and predictable positive relationship between price and quantity supplied. Formally, supply is defined as the quantity of a good or service that a population of sellers is willing and able to sell at every conceivable price. This positive relationship is shown graphically by the supply curve on the left - SS. If the price changes there is a movement along the supply curve (see Figure 7). At price P the osteopath population is prepared to sell Q treatments. When the price rises to P' the osteopath population is prepared to sell Q' treatments - this might be because more people become osteopaths when it becomes a more lucrative job.

Figure 8a. SS is the initial supply curve for treatments. Now nurses' wages rise, pushing up osteopaths' costs. Osteopaths react by being prepared to supply fewer treatments at each price. The supply curve shifts inwards to S' S' . At a price such as P' osteopaths are now only prepared to sell Q'' treatments rather than Q'.

Change in costs

If the level of factor costs changes then the supply curve will shift. For example nurses' wages could go up or the rent could fall. Let's look at the effects of these.

In Figure 8a, SS is the initial supply curve for treatments. Imagine that nurses' wages rise, pushing up osteopaths' costs. The osteopaths react by being prepared to supply fewer treatments at each price (this may be because there are fewer osteopaths). At a price such as P' osteopaths are now only prepared to sell Q'' treatments rather than Q'. The supply curve shifts inwards to S'S'.

Now imagine that rents fall. The profit of osteopaths will increase for each treatment. The osteopath population will react by being prepared to supply more treatments at each price. See Figure 8b. At the price P' osteopaths are now prepared to sell Q''' treatments rather than Q'. The supply curve shifts outwards.

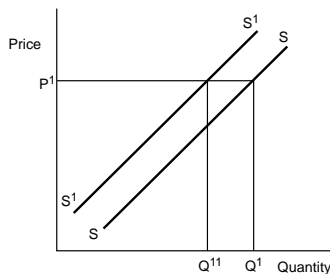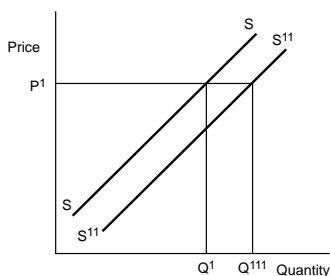Figure 8b. SS is the initial supply curve for treatments. Now rents fall and osteopaths react by being prepared to supply more treatments at each price. The supply curve shifts outwards to S'' S''. At a price such as P' osteopaths are now prepared to sell Q''' treatments rather than Q'.

c. The market
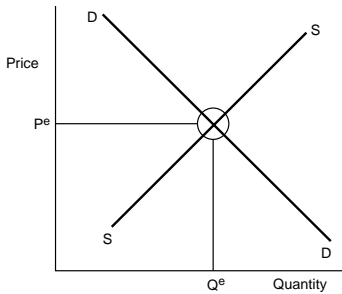
Figure 9a

We can now put the demand and supply curves together. This will give us a picture of the market for osteopathy. This is shown by Figure 9a. Notice that there is only one price at which the quantity of treatments people want to buy is the same as the quantity the osteopaths want to sell. This is called the equilibrium price Pe. The corresponding quantity is the equilibrium quantity - Qe. The equilibrium is a state of rest where there is no pressure for change.

At any other price either buyers or sellers are dissatisfied and act to change the quantity demanded or supplied.

Excess demand
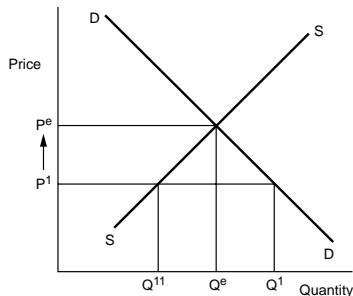
Figure 9b

If there is excess demand, consumers bid up the price. In Figure 9b, at price P' consumers demand Q'. The price is low so a lot of people are willing and able to buy treatments. However, the low price means that there aren't enough osteopaths prepared to provide this amount of treatment. They are only prepared to provide Q". The excess demand (Q' – Q") causes the consumers to bid the price up to the equilibrium price Pe.

Excess supply
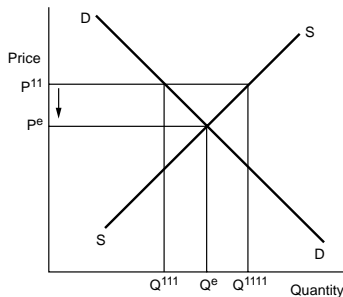
Figure 9c

In Figure 9c at P" the price is too high. Consumers only demand Q''' treatments. However, the osteopaths want to sell more treatment: Q"". So there is an excess of supply (Q"" – Q'''). This will lead to osteopaths having to cut their prices (to encourage more consumers to buy treatment). As sellers, they will have to reduce their prices until they reach the equilibrium price Pe.
So the free interaction of buyers and sellers in the market automatically leads to a single price at which the quantity traded 'clears' the market, i.e. the quantity supplied equals the quantity demanded.

d. How a market allocates resources

Figure 10

We have shown how supply and demand combine to give a single stable price and output - the equilibrium. But what happens when something comes along and upsets this equilibrium?

Economists call anything which moves a market out of equilibrium a shock. Shocks could come from shifts in demand caused by such things as changes in income or from shifts in supply caused by such things as a change in costs. In each case the shock upsets the market equilibrium. How will the market respond?

How the market responds to a shock

Let's analyse the reaction by looking at a demand shock caused by a rise in people's incomes. How will the osteopathy market react? The graph on the left, Figure 10, shows the initial supply and demand curves - SS and DD. The initial market equilibrium is at a price P' and quantity Q'.

Now imagine that there is an increase in people's income. The demand curve will shift outwards to D'D' because people are willing to buy more osteopathy treatments at the same price (osteopathy is a normal good). This shift in demand throws the market out of equilibrium. Now people want to buy Q"' treatments at price P' but the osteopaths are still only prepared to sell Q' at that price. The result is excess demand and unsatisfied buyers who react by 'bidding up' the price. The rise in price simultaneously reduces the demand and increases the supply until the market regains equilibrium at a new price and quantity.

The rise in people's incomes has led to a new equilibrium at a higher price P" and a higher quantity Q" than before.

This process will occur whenever there is shock leading to either a shift in demand or supply. The market will move out of equilibrium with either excess demand or excess supply appearing. The price will then adjust until equilibrium is regained.

The 'invisible hand'

We have just demonstrated that our free market will automatically produce an equilibrium price and quantity. It is this which makes it a very powerful allocation system. (See page 10 in Unit 1). This is what Adam Smith (the founding father of economics) referred to as the "invisible hand".

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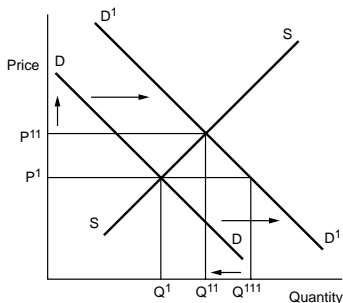
Who decides how much osteopathy is to be produced? The answer in a free market is consumers. They go out and buy osteopathy treatments and the price they are prepared to pay sends signals to the osteopaths. The osteopaths respond by producing either more or less treatment. The market not only allocates resources automatically, it does so efficiently. Providing certain conditions are met, the free market will achieve a Pareto efficient allocation. (See page 8 in Unit 1).

From price mechanism to a Pareto efficient allocation

For the consumer, the price they are willing to pay measures the benefit or utility that the consumers expect to receive from consuming the last unit. To be precise, the demand curve reflects the marginal utility (extra benefit) that consumers receive from consuming the last unit. Consumers only buy something if it is worth as much as or more than the other things that the same money could buy. So if the price of something is greater than the benefit they get from consuming it, they will not buy it.

For the producer or seller, the price they are willing to accept measures the cost of the resources involved in the production including the supplier's own time and effort. Again to be precise, the supply curve reflects the seller's marginal costs (the cost of producing an extra unit). Thus when a market is in equilibrium marginal benefit equals marginal cost equals price. The benefit received from the last unit consumed will exactly equal the resource cost of producing that unit. This fulfils the condition for allocative efficiency. Competing producers chasing maximum profits will always choose the least cost combination of factors to produce a given output. Consequently, the free market will also be productively efficient.

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e. Case study - cosmetic surgery

How well does our theoretical model of a market explain what has been going on with cosmetic surgery? Look at this newspaper report on the growth of cosmetic dentistry.

Putting your money where your mouth is

Maggie Smith is a publisher in her late 40s who has just splashed out on a £1,400 "tooth lift". "I saw the treatment as an investment. Compared with the cost of a couple of outfits, it's not that expensive and it lasts much longer".
Smith purchased her cosmetic dentistry from Dentics on London's Kings Road. Dentics opened its first "tooth boutique" four years ago and now has three London branches. Customers can walk into the shop-fronted surgeries without an appointment and browse through albums of photos showing wayward canines tamed into piano keyboards by bleaching, filing down, building with resins or covering with porcelain veneers. Each treatment costs around £200.
Primary school teacher Elizabeth Eccose-Westley regarded the treatment as an affordable luxury. "I'm not rich and I'm not vain, but at 42 I started to feel I was getting long in the tooth. I spent £1,000 on porcelain veneers, instead of a summer holiday, and it's really boosted my confidence. Give it another couple of years and people won't think twice about it. Everybody will be having it done."

Emma Brooker Guardian 16.9.93

More durable and lifelike dental porcelains and resins, developed recently, have given rise to specialists in cosmetic dentistry selling off-the-peg designer smiles.

Clearly there is a demand for cosmetic dentistry - people are willing and able to pay for it. Both the women in the article viewed the cosmetic treatment as something which gave them 'utility', i.e. satisfaction, and they consciously compared the satisfaction gained with that from other purchases.

The article also provides evidence that the market is growing. Why is this happening?

Economic analysis

The initial supply and demand curves are shown in Figure 11a - the system is in equilibrium.
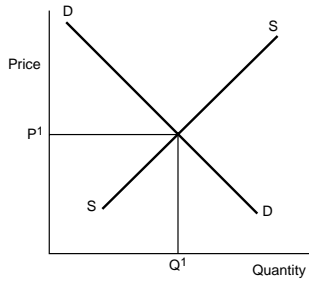
The first change is that technology has reduced the costs of such treatment - shifting the supply curve outwards. Demand also seems to be growing; why is this? According to a recent national survey, one in four people dislikes their appearance suggesting that they would consider buying this kind of treatment if they could afford it. So consumers are likely to respond to the lower prices brought about by the shift in supply - a movement down the market demand curve. This sets up a new equilibrium at P" and Q" in Figure 11b.
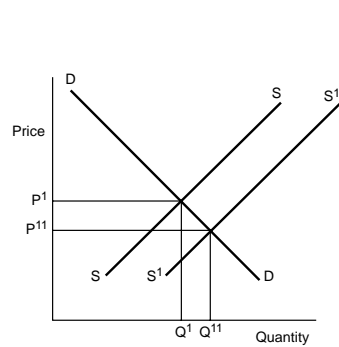
The next change is an increase in consumers' real income leading to an outward shift in the demand curve from DD to D'D'. See Figure 11c. So there is a near equilibrium at P''' and Q'''.

Suppliers have reacted to the growth of consumer demand in exactly the way our theory predicts. Dentics has expanded its operations by opening more shops and providing more treatments.

Reduced costs and extra consumer demand have both led to the allocation of more resources to cosmetic dental treatment. So our model has performed fairly well. But we can develop it further by introducing the concept of elasticity.

Figure 11 a

Figure 11 b

Figure 11 c

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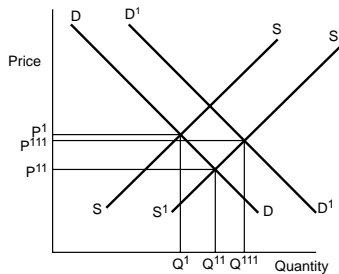
f. Elasticity

Elasticity provides a way of measuring how sensitive demand or supply is to factors such as a change in price. Take the relationship between price and quantity demanded. We know that if price rises then people will buy less but we do not know how much less. Price elasticity of demand allows us to calculate this.

Price elasticity of demand (PED)

The formula for price elasticity of demand (PED) is

$$\frac{\% \text{ change in quantity demanded}}{\% \text{ change in price of the good}}$$

So if the price of osteopathy rose by 10% and the quantity bought fell by 5% then the PED would be –5%/+10% = –0.5. This tells us that demand for osteopathy is not particularly sensitive to changes in price. It is what economists call **price inelastic**. Take another example, if the price of eye tests fell by 20% and the quantity of eye tests bought rose by 30% then the value of PED would be +30%/–20% = –1.5. In this case the demand for eye tests is **price elastic**, i.e. sensitive to changes in price.

Notice several things about PED. First, the value of PED is always negative reflecting the inverse relationship between price and quantity demanded. Second, PED is just a number, it is not expressed in terms of any particular units.

How do we know whether demand is elastic or inelastic? The rule is:

Demand is price inelastic whenever the % change in price leads to a smaller % change in quantity demanded. This gives PED values between 0 and –1.

Demand is price elastic whenever the % change in price leads to a larger % change in quantity demanded. This gives PED values between –1 and –infinity.

Price elasticity of demand allows us to predict what will happen to spending when price changes. Take the example of the increase in the price of osteopathy used above. As the price of osteopathy rises, people will buy fewer treatments but will they spend less? Suppose the price of a treatment rose from £20 an hour to £22 (a price increase of 10%). At £20 an hour, consumers were buying 1,000 treatments per week and spending £20,000. After the price rise they bought 950 a week (a fall of 5%) but their spending had risen to £20,900 (= 950 x £22). So the answer in this case is no. People spend more on osteopathy after the price

rise because the percentage increase in price is greater than the percentage fall in sales volume. So although osteopaths sell fewer treatments, the higher price of each treatment more than offsets the lost quantity of treatments sold. This gives us a general rule:

If PED is inelastic, a rise in price will lead to people spending more while a fall in price will lead to people spending less.

If PED is elastic, a rise in price will lead to people spending less while a fall in price will lead to people spending more.

Price elasticity of demand allows economists to analyse and predict the effect of changes in prices on different markets. We can see an example of this by looking at the debate over cost sharing in health care.

Cost sharing in health care

Cost sharing is the term used to describe different forms of direct charging for health care services. Increasingly, direct charging is seen as a way of reducing demand but also as a way of raising revenue. How effective is this policy? For instance, in the UK, many people have to pay prescription charges, that is they have to pay a certain amount every time they want to have a prescription dispensed. What has been the effect of this charging? Estimates made by Hughes and McGuire have indicated that demand for prescriptions is rather price inelastic with a mean value of –0.32. This would suggest that prescription charges would be an effective way of raising revenue but not have a great effect on the level of demand. Hughes and McGuire calculated, for instance, that the rise in prescription charges from £3.75 in 1992 to £4.25 in 1993 would have resulted in the generation of an estimated £17.3 million in extra revenue but led to a fall of 2.3 million in the number of prescriptions dispensed. However, their research also suggests that demand for prescriptions is becoming more price elastic as time passes. They found that PED was –0.125 in 1969, –0.22 in 1980, –0.68 in 1985 and –0.94 in 1991. This suggests that raising prescription charges is now likely to raise less revenue but lead to greater reductions in use of prescribed medicines than it did in the past.

Other forms of elasticity

The concept of elasticity can be applied to the impact of both income and changes in the prices of other goods on quantity demanded. **Income elasticity of demand (YED)** measures how demand reacts to changes in income. The formula for **income elasticity of demand** is:

% change in quantity demanded

% change in income

If the result is positive then the goods are normal, if it is negative then they are inferior. All the evidence suggest that health care is not only a normal good but that it is income elastic, i.e. rising income leads to a greater % rise in demand for health care.

Cross price elasticity of demand (XED) measures how demand reacts to changes in the price of other goods.

The formula for **cross price elasticity of demand** is:

% change in quantity demanded of main good
% change in price of other good

If cross price elasticity of demand is positive then this indicates that the goods are substitutes. If it is negative then the goods are complements.

Finally, the concept of elasticity can be applied to supply. **Price elasticity of supply (PES)** measures how sensitive quantity supplied is to a change in the price of the good.

The formula for **price elasticity of supply** is:

% change in quantity supplied
% change in price of the good

Price elasticity of supply is always positive, reflecting the positive relationship between price and quantity supplied. PES becomes more elastic over time. This reflects the time it takes to switch resources into a market. For instance, in health care the PES is likely to be fairly inelastic in the short run but much more elastic in the long run. Even if price rises significantly it will take time for firms to react and to produce more health care. For instance, to deliver more health care new hospitals will need to be built or existing hospitals extended and extra doctors and nurses will need to be trained. All of this takes time.

The concept of elasticity has helped to make our market theory more sophisticated. However, the model still suffers from being rather static.

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g. Markets as dynamic systems

One thing the market is able to do very well is act as a powerful and efficient information system. Changes in consumers' tastes are quickly communicated to producers via market prices. The search for profits drives producers to offer new products or services and make them in more cost effective ways. An example of this is the way in which consumers' concern over the link between high cholesterol and heart attacks has led to the appearance of cholesterol testing units at chemists and health food stores in the UK.

Competition and the need to respond to and, if possible, anticipate consumer demand lead to a system which provides the maximum choice for the lowest possible cost; a system which is flexible, dynamic and efficient.

Real world markets

Some economists, such as Hayek, argue that in the real world most markets will be in a constant state of flux - always adjusting towards equilibrium but rarely actually reaching it. In this analysis, it is the market's ability to act as an information system that is important rather than its ability to produce a single equilibrium price.

Take our market for cosmetic dental services. If the market were free and competitive, then different dentists would offer different mixes of service, and some dentists would be more skilful than others. The skilful dentists offering the services consumers want would have lots of customers and would be able to charge higher prices than their competitors. This would force the other dentists to modify the services they are selling to try to capture back the consumers. This process of competition would be continuous, particularly as other factors influencing demand and supply, such as levels of income or the state of technology, are likely to be changing as well.

This kind of analysis has led some economists to argue that health care should be provided by the market not by the state. We look at this in the next section 'Health care - case for a free market'.

ii. Health care - case for a free market

What would happen if all health care were bought and sold in the market? The answer to this question is fiercely debated. Free market economists such as David Green argue that the market would deliver the best possible care at the lowest possible cost. In How to Pay for Health Care. Public and Private Alternatives, IEA Health and Welfare Unit, London June 1997, he contrasts a free market system with the NHS which he regards as a command system financed by compulsion (i.e. taxation). He argues that the command model suffers from a number of problems:

*   it does not use prices and so has to plan and ration using other tools
*   it has no way of overcoming the problems of uncertainty and imperfect information
*   it gives the suppliers the power to impose unwanted treatments on consumers.

No prices

The NHS does not use prices in the way a free market would. Green argues that this means that there is no way to evaluate how much people want a particular health care service. Furthermore the lack of prices means that the suppliers have no way of knowing what services to produce and in what quantities. The result is rationing. Neither of these problems would occur in a free market. As Green says, prices provide a way for consumers to compare "the cost of health care with other desirable things, from consumer durables to the education of children. They also send signals to suppliers about the quantity and quality of care being demanded." This allows producers "to judge how many facilities of various types to provide."

Uncertainty and imperfect information

Health care is a market where changes in technology are occuring all the time. How can we decided whether a new way of treating a medical condition should be used or how widely it should be used? In the NHS the planners, the 'experts', decide for us. Green argues that the market provides a much better way of answering these questions. He says that it is best to allow many people to try out alternatives in the hope of learning from their experience. This means that the 'best' answer emerges from a process of trial and error by a large number of people.

Power to impose unwanted treatments

If we let the experts make decisions for us then we can find that they impose treatments on us against our will. Green cites the example of NHS childbirth services. He argues that "from the 1950s to the 1970s ... under the guise of science in the service of saving life, medical power was used to induce births to fit the convenience of medical employees". As a result there were more complications and clinical damage. He also states that "Many mothers have reported that during those years they were pressurised into accepting dubious medical advice".

Conclusion

Green concludes "A competitive market is not a technical invention which allows pre-defined objectives to be met, but a system which allows scope for human ingenuity to design and redesign ways of improving our lives. It is based on the assumption that we are constantly learning. In particular, it rests on the belief that no authorities can set themselves up in advance on the basis of their training or expertise as the ones who should inevitably have the power of decision."

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Case study - health care in the US

In an earlier book "Challenge to the NHS", IEA 1986, Green looked at the performance of the health care market in the US and came to the conclusion that the introduction of a more effective free market in the early 1980s resulted in the emergence of a flexible, cost effective system. He claimed that problems often associated with the American health care system, such as rapidly rising costs and doctors providing patients with unnecessary surgery, were the result of a failure of the free market to operate.

Doctors' monopoly

Green argued that the problems of US health care in the 1960s and 1970s were the result of the doctors' monopoly power over supply. The doctors achieved this partly by restricting entry to the medical profession through limits on entry to medical schools and partly by keeping consumers in ignorance. The doctors' association, the American Medical Association (AMA), "was able to keep a tight grip on the number of doctors trained and hence to limit the supply of doctors in active practice." They also maintained the monopoly by preventing doctors from advertising which prevented consumers from gaining the information they needed to make a rational market choice.

This monopoly power was fatally undermined in 1982 when the US Supreme Court outlawed the AMA's ban on advertising. The Federal Trade Commission had already enforced a number of other pro-competition policies on the doctors such as making price fixing by the Michigan State Medical Society illegal. Combined with a significant expansion in the number of doctors, this led to the effective emergence of competition between them. Green argues that the emergence of this effective competition in the health care market has led to exactly the results predicted by the free market model.

Since Green wrote this paper, new types of health care purchaser have grown up in the US, called Health Maintenance Organisations (HMOs). These have more bargaining power over doctors on behalf of the patients who are insured with them. This is seen by many commentators as a further example of the free market working, although others have argued that HMOs restrict patients' access to doctors in order to hold down costs.

What are the results?

As we saw earlier in this Unit a free market will provide an allocation which is allocatively efficient. This means different types of health care in a mixture which accurately reflects consumer demand. It will also be productively efficient and so deliver the health care for the lowest possible cost.

The growth of new providers of health care such as day surgery centres offering one-day surgery, home health agencies and walk-in emergency clinics has given consumers more choice.

Green believes that American consumers now have a much greater choice of where to get their medical treatment and that increased competition has led to the producers of health care becoming more responsive to consumer demand.

Another result of the increase in competition, Green argues, has been a significant fall in costs. In other words he claims that American health care has become more productively efficient. He cites as evidence the fall in hospital use and the fall in visits to doctors' surgeries between 1981 and 1985 - "the producers are on the defensive as competition cuts costs and promotes high quality".

Fitting the free market model

Green believes that the extension of the free market in health care in the US in the early 1980s brought substantial benefits, and in particular delivered exactly the kind of result that the free market model predicts. He does not claim that the American health care system is without problems but he does believe that those problems stem from the effects of state interference rather than the failure of the market.

Many economists would totally disagree with Green. They argue that a free market cannot operate effectively in health care. To see why go to the next Unit in this e_source - 'The case against a free market'.

iii. Questions and activity

Questions

1. Table 1 shows a hypothetical demand schedule for GP services in a town where there is no free health service.

Price of GP consultations	Quantity of GP consultations demanded per month
0	600
£5	400
£10	150
£15	100
£20	90

Table 1

a) Draw a demand curve for GP services using this information.

b) If the price of a consultation is £5, what is the total amount that people will spend on consultations? Show this on your graph.

c) If the price of a consultation rose from £10 to £20, what would happen to the quantity demanded?

2. Table 2 shows a hypothetical supply schedule for GP services in a town where there is no free health service.

Price of GP consultations	Quantity of consultations GPs are prepared to supply per month
0	0
£5	40
£10	80
£15	100
£20	150

Table 2

a) Draw a supply curve for GP services using this information.

b) If the price of consultations rose from £5 to £15, what would happen to the quantity of consultations GPs are prepared to supply?

c) Suppose the costs facing GPs rose by 10%, and this led to a 10% reduction in the quantity of consultations the GPs were prepared to supply at every price. Draw up a new schedule to show the effect of this.

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d) Draw a new supply curve to show the effect of the increase in costs (on the same diagram as the original supply curve).

3. Use the information in Tables 1 and 2 to draw a market diagram for GP services.

a) What is the equilibrium price and quantity?

b) How much revenue are doctors then receiving?

4. Use the information in Tables 1 and 2 to draw a market diagram for GP services.

a) A fall in costs causes supply to increase by 70 consultations per month at every price. Illustrate this on the market diagram.

b) What is the new equilibrium price and quantity?

c) Describe how the market reaches its new equilibrium position.

d) An increase in income now causes demand to increase by 70 consultations per month at every price. Illustrate this on the market diagram.

e) What is the new equilibrium price and quantity?

f) Describe how the market reaches its new equilibrium position.

Type in your answer, then click here to compare your answer with our guide answer

⊘HE

Is this the short cut to perfection?

In the quest for glamour and good looks, more and more youngsters are asking plastic surgeons to give nature a helping hand. Plastic surgery is gaining popularity among the young. At the Poutney Clinic, the average age for a nose job (rhinoplasty) is now just 22, down from 31 in 1985. The average for ear correction is 21. It is not yet as common in Britain as in America, where 640,000 operations were performed last year and where TV programmes like Beverley Hills 90210 suggest you're not allowed to graduate from a Californian high school unless you've got a liposuctioned bum. A 20 year old waiting for a breast enlargement operation at the West Hampstead Clinic when asked why now, replied "We've just got the money. My husband got a big quarterly bonus"

Adapted from an article by Robert Leedham, The Guardian 6.9.91

5. Read the passage on the left, then answer questions a) to e).

a) Why are more young people demanding plastic surgery?

b) What would you expect to happen to the price of plastic surgery as demand grows?

c) Try to draw a simple supply and demand diagram to analyse this information.

d) How would you expect suppliers to react to the increase in demand?

e) Market theory assumes that the consumers are able to make rational buying decisions. Do you think that this applies to cosmetic surgery?

Type in your answer, then click here to compare your answer with our guide answer

Activity

Carry out some further research on the market for cosmetic surgery among the young. Information on the treatments being offered can be found by looking at the adverts in the popular press or magazines. You might also survey your friends to try to identify the factors which influence demand.

3. The case against a free market

Why not leave health care to the market?

Most people believe that you cannot buy and sell health care like other goods and services. They believe that health care is different. This is what is sometimes called a "common-sense" approach to the issue. Look at the first activity in Questions and Activities to develop this idea further.

Economists approach the same question rather differently. They analyse the question of health care and markets from a theoretical perspective. The main theory they use is called market failure.

In this unit we will look at the issue of market failure in general and then look in detail at the problems that health care markets face. After that we will look at the issue of equity again.

i. Market failure - an overview

In theory, markets produce the goods and services we want in the right quantities and at the lowest possible cost. This is why markets are so powerful. But in the real world markets do not always work in the way theory predicts. It is possible for a free market to produce a Pareto inefficient result - i.e. the market fails.

An information system

A market is an information system. We get the right goods at the lowest possible cost because the market is able to transmit all the information about benefits and costs between producers and consumers (see page 19). If this information is less than perfect, then the market will fail.

Think about buying a CD. You know what a CD is, and you will also have a good idea of the kind of music on the disc.

You have enough information to estimate how much benefit you will receive from the purchase of a CD.

So you are able to relate your benefit to the price of the CD. If we look at the market for CDs, people will go on buying CDs until the extra satisfaction from the last CD is exactly equivalent to the price of the CD. We have reached the situation where we as a society are consuming the 'right' quantity of CDs in the sense that we are gaining the maximum possible satisfaction from CDs given their price.

Why might markets fail?

But health care is rather different from CDs. We face very acute information problems which make rational purchasing decisions difficult if not impossible. For instance most people do not know the best way to treat a stomach ulcer so they would find it difficult to buy such treatment.

This analysis also assumes that the only people receiving benefit or satisfaction from the CDs are the people buying them. In other words, the price of a CD accurately conveys the level of satisfaction received. This ignores the possibility of externalities or 'spillovers'. Think about someone hearing your CD and enjoying it - they are also receiving satisfaction from the disc but the market is unable to provide any information about the benefits they are receiving unless they specifically share the cost of buying the CD. Whenever externalities occur, the market fails. Many economists believe that there are strong externality effects related to health care. For example caring for a sick person can impose financial costs on that person's family. We discuss externalities more fully in subsection vi of this Unit.

Perfect competition

An efficient free market requires producers to be operating under conditions of perfect competition. This requires a stringent set of conditions - perfect information, many buyers and sellers, a uniform product and freedom of entry and exit - which ensure that firms are price takers, producing for the lowest possible cost in the long run and only earning normal profits.

If producers do not operate in this way and, in particular, if they have a significant power to influence price or the total quantity being produced, then the market will fail. Doctors and other suppliers of health care often have this power.

ii. Problems of risk and uncertainty

If we are going to buy health care in a free market, then we have to have enough money to pay for it. But health care is expensive and we cannot predict when we are going to be ill. What makes this worse is that postponing buying health care is often risky. So we face the problems of risk and uncertainty.

The market response to this problem is to develop an insurance market to remove the uncertainty and risk from health care spending. We pay an agreed amount of money per year whether we need health care or not. But then, when we need care, the insurer pays the bills, however large they are.

So a free market in health care requires an effective health care insurance market. Unfortunately, the health care insurance market itself is often not efficient. Moral hazard and adverse selection both cause significant market failure.

Moral hazard

Having insurance can change the way in which we act. Imagine you are in a cinema and the film is just about to start. Then you remember that you have left your bicycle unlocked. What do you do? If you have comprehensive insurance which will compensate you against any loss you are much more likely to carry on watching the film. Your attitudes have been changed by the fact that you have got insurance - this is what economists call moral hazard. Moral hazard can affect any insurance market but is a particularly serious problem for health care insurance. Consumers who are insured have an incentive to over-consume health care - to demand operations and treatments which they would not choose if they were directly paying for them. They may also not bother to follow a healthy lifestyle or to get preventative check-ups. As a result when they do fall ill, the cost of treatment is higher than it would otherwise have been.

Doctors too are affected by moral hazard. They know that the costs of treatment are covered by insurance so the temptation is to over-treat and over-prescribe medicines for their patients. Moral hazard thus leads to an inefficiently large quantity of resources being allocated to health care.

Instead of directly buying health care from doctors and dentists, some people buy health care insurance from companies like British United Provident Association (BUPA) or Norwich Union.

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Adverse selection

The price of health insurance is often too high for people like this to afford.

A company selling health care insurance has to estimate the level of risk accurately . This is difficult because they will not have complete information on the risk status of the person they are insuring. One solution is to set the premium at an average risk level. But this makes the policy expensive for low risk customers who therefore may choose not to buy the insurance. This process whereby the best risks select themselves out of the insured group is called adverse selection.

Insurance companies know that this is likely to happen so they offer different premiums according to the level of risk and the person's experience of ill health. This is why most companies will offer non-smokers a lower premium than smokers. Offering low insurance premiums to low risk groups, often called 'cream skimming' or 'cherry picking', means high premiums have to be charged to high risk groups such as the elderly or chronically sick.

So in a free market, health care insurance is likely to be too expensive for many people, and especially for those most in need of health care.

iii. Unequal information - doctors as agents

Moral hazard and adverse selection help to explain why a free market in health insurance is unlikely to be efficient. However, health care markets face even more fundamental information problems. We are now going to examine the problems caused by unequal information and the consequent role of doctors as agents for patients.

Monitoring the heart

Doctors use an electrocardiogram (ecg) to monitor a person's heart.

"The pains in my chest intensified. I tried to remember if I was wearing sensible or frivolous underwear. I knew that within a few minutes all would be revealed. My doctor arrived looking unfamiliar in his Sunday morning clothes, and took me into a side room where he hooked me up to an electrocardiograph machine. There was trouble at t'mill. A lockout. The blood couldn't easily get into the heart. There was an obstruction of some kind. I was wheeled into Intensive Care, more of my frivolous underwear was revealed, I began to feel peculiar and for a split second I thought I was going to die….. So this is what it is like to have a heart attack, I thought. No clasping of the throat and dramatic

staggering around before falling on the floor, more a sliding into helplessness and then a murky, confused leaving behind of your body"

Sue Townsend's description of how she felt as she had a heart attack emphasises the fact that we are often not in the position to make rational purchasing decisions about health care.

Rational choices

When you go into a shop to buy a CD you have enough information to make a rational choice: you do not need the shop assistant to tell you what you should buy. Going to the doctor is very different. You know that you perhaps do not feel well and that you have particular symptoms, but most people are not able to diagnose their complaint: they want the doctor to do that. What is more, you then rely upon the doctor to specify the treatment - if the doctor says you need an expensive operation then you buy it.

Patients are dependent upon doctors for the information they need to make their buying decision.

In the health care market information is not equally shared between buyers and seller, instead the seller, the doctor, has far more information than the buyer, the patient. This asymmetry of information undermines the separation of buyers and sellers.

This situation is not unique to health care but there are a number of factors which make this information asymmetry particularly acute there.

Information problems

Most medical information is technically complex and so not easily understood by a layman and this is made worse by the fact that many illnesses do not repeat themselves, so that the cost of gaining the information is very high. You could argue that the only way a patient could become fully informed would be by training to be a doctor!

The costs of a mistaken choice are much greater and less reversible than in other cases: in the worst situation if you make the wrong decision you will be dead. It is also often difficult to postpone treatment and so virtually impossible to shop around, and anyway how do you judge between different doctors' opinions?

Doctors as agents

The asymmetry of information makes the relationship between patients and doctors rather different from the usual relationship between buyers and sellers. We rely upon our doctor to act in our best interests, to act as our agent. This means we are expecting our doctor to divide herself in half - on the one hand to act in our interests as the buyer of health care for us but on the other to act in her own interests as the seller of health care.

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In a free market situation where the doctor is primarily motivated by the profit motive, the possibility exists for doctors to exploit patients by advising more treatment to be purchased than is necessary - supplier induced demand. Traditionally, doctors' behaviour has been controlled by a professional code and a system of licensure. In other words people can only work as doctors provided they are licensed and this in turn depends upon their acceptance of a code which makes the obligations of being an agent explicit or as Kenneth Arrow put it "The control that is exercised ordinarily by informed buyers is replaced by internalised values"

Supplier induced demand

So if doctors behaved like some financial advisers or computer salesmen in the past and maximised profits without any limit from a professional code, we would expect supplier induced demand to be a very major problem. But any system of licensure strong enough to provide the internalised values that Arrow talks about is also likely to give the medical profession power to limit the number of doctors operating. Thus licensure and a professional code are in themselves also a source of market failure.

The dependence of patients upon their doctors is increased by the fact that most people are anxious about being ill.

iv. Consumers as satisfaction maximisers

Are consumers rational satisfaction maximisers?

Market theory assumes that consumers know what is best for themselves - that is they can make choices which will maximise their total satisfaction. If this assumption is wrong then markets will not automatically produce efficient results.

Economists call the satisfaction that consumers get from consuming a good or service utility. So the extra satisfaction from consuming a bit more is called marginal utility while the total satisfaction gained from consuming the whole amount is referred to as total utility. The satisfaction gained simply depends on the quantity and mix of goods and services chosen. The theory assumes that consumers get more satisfaction from more goods and services but that the increase in satisfaction from consuming another unit - the marginal utility - diminishes as consumption rises.

Maximising utility

How do consumers go about choosing the mix of goods and services which give them the maximum total utility? They start by thinking about what they like (their tastes/preferences) and then look at how much money they have to spend (their income) and the prices of the different goods and services. They then choose the combination which gives them the highest utility for the money spent. We introduced this idea earlier when we talked about a consumer buying CDs. We argued that
"you are able to relate your benefit to the price of the CD. If we look at the market for CDs, people will go on buying CDs until the extra satisfaction from the last CD is exactly equivalent to the price of the CD. We have reached the situation where we as a society are consuming the 'right' quantity of CDs in the sense that we are gaining the maximum possible satisfaction from CDs given their price."

"By choosing a particular bundle of goods, people demonstrate that they prefer it to all others; consequently, it is best for them. And, if all people are in their best position, then society - which is simply the aggregation of all people - is also in its best position. Therefore, allowing people to choose in the marketplace results in the best of all possible economic worlds" - Thomas Rice.

Another view of consumers

However, Thomas Rice in The Economics of Health Reconsidered suggests a range of reasons why this view of consumer behaviour could be mistaken. Here are three of them:

1.   The idea that consumer utility just depends on the bundle of goods and services consumed. If this were true then people in rich developed economies ought to be appreciably happier than people in poor developing economies. However, research by Easterlin in 1974 showed that "average levels of happiness are fairly constant across countries; people in poor countries and wealthy countries claim to be equally happy" – Rice. Easterlin's research suggested that utility depended on your relative consumption - so rich people were happier than poor people in all societies. This means that if you consume more that could reduce my utility because I am now relatively worse off.

2.   Traditional theory ignores the issue of how tastes are determined. Evidence from social psychology suggests that tastes are determined by people's past and present environments. So for instance, if you are in a peer group which smokes then you are likely to develop a 'taste' for smoking which will remain even after you have left the peer group. If this is true then it is not clear that satisfying tastes will actually make people better off. In fact "If one believes that tastes are determined in such a way, then it becomes clear that a society might be better off pursuing some goods and services that are not demanded most strongly by the public. This is because people might not know what alternatives are available that will make them better off".

3.   Are consumers rational? What do economists mean by the concept of rationality? In a narrow sense they mean that people will behave consistently - so if they prefer A to B and B to C then they will prefer A to C. More widely, they mean that people will behave in a reasonable manner. If consumers are not rational in this sense, then they will not necessarily make decisions which maximise their welfare.

Social psychology suggests that people are often not rational in this sense - instead they exhibit what is called cognitive dissonance. In other words, they simultaneously hold two ideas which are psychologically inconsistent and use various forms of self-justification and rationalization to overcome the tension. Take the issue of saving for old age. It is rational to do this but nevertheless often people do not do it. Why not? Well the act of saving forces you to face up to the reality of ageing. If you are scared of getting old then you are likely to refuse to contemplate this and so choose not to save. Cognitive dissonance suggests that people will often not make decisions which maximise their utility.

Rice argues that the issues raised above are particularly important in health care markets. Consumers are unlikely to be in a position to appreciate the full range of possibilities available to them and so need expert help to guide them. This is particularly true as many situations affecting health are likely to produce cognitive dissonance. If utility is relative then this suggests that society would be better off with some form of universal provision rather than one based on individual health care purchases.

v. Imperfect competition

The free market model envisages large numbers of buyers and sellers - all of whom have no power individually to influence the market price. However, a significant proportion of health care is delivered by hospitals and these hospitals can often exercise monopoly power within the health care market in the local area.

Monopolies

Why should hospitals be able to act like monopolies? The answer is that hospitals have an incentive to grow in size and in the range of services provided. This leads to the emergence of one large hospital in an area rather than a large number of small hospitals. The incentive to grow is falling unit costs - what economists call internal economies of scale and economies of scope.

Internal economies of scale and scope have led to the emergence of large hospitals which often are the only hospital in the area.

Economies of scale

Why should the average cost of providing treatment fall as a hospital becomes larger? There are a number of reasons.

1. A large institution is able to make more use of specialisation. This can involve both people and capital. A large hospital is able to develop specialist medical units employing both highly skilled surgeons and specialist capital equipment. Such a hospital is also able to employ specialised managers and ancillary staff which will allow it to operate more efficiently.

2. A large institution is able to achieve purchasing economies of scale through bulk buying.

3. A large hospital prevents wasteful duplication of facilities. There will only be a limited number of patients with a particular condition needing particular skills and equipment in any one area. Concentrating the treatment in one place allows the most efficient use of resources.

Economies of scope

In many cases it costs less to provide a range of services in a single hospital rather than have several hospitals each just producing one or two services. For example, emergency surgery and treatment of heart attacks are more cost effectively provided in a single hospital rather than two separate ones.

Price maker

In this situation, the hospital as supplier of health care services has considerable power to bargain over price. Instead of being a price taker it is a price maker. In this situation a free market does not lead automatically to a Pareto efficient outcome. In particular, if the hospital is profit maximising then it will set price above marginal costs giving an allocatively inefficient outcome. Also it is likely that the hospital will be productively inefficient, since it lacks the incentive to reduce costs which would be provided by competition.

vi. Externalities

Externalities or spillover effects provide another source of market failure. Again the problem is related to information. This time the market price does not accurately contain all the information about the benefits and costs of the market transaction. Earlier we outlined how this might occur when a consumer bought a CD. Now we are interested in how this might operate in a health care market.

Vaccinations

Suppose vaccination against infectious diseases were bought and sold through a free market.

You are thinking about the benefits to you of not catching whooping cough – the price you are prepared to pay for vaccination will depend on your personal, private valuation of the benefits you receive. Going from a single consumer to the market, we can analyse the interaction of supply and demand for vaccinations using a diagram.
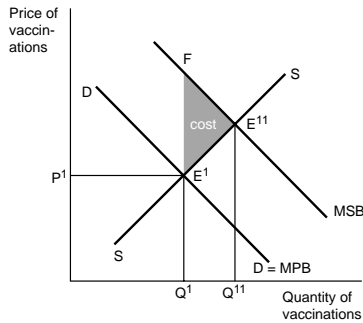
OHE

Price of vaccin-ations

Figure 12

In Figure 12 on the left, DD shows the market demand for vaccinations. The amount of vaccination that private individuals will be prepared to buy at each price will depend upon their estimate of their personal benefit from being protected against whooping cough. In formal terms this means that DD represents the marginal private benefit (MPB) that consumers receive. The market supply of vaccinations is shown by SS. The free market equilibrium is at price P' giving Q' vaccinations.

However, when you are vaccinated against whooping cough you are not the only person to benefit. Other people also gain because they are now protected against catching whooping cough from you. This extra or externality benefit is missed by the free market. We can show the effect of this on the diagram. MSB represents the marginal social benefit from vaccination, that is all the benefits received by society. MSB is made up of all the private benefits consumers receive (MPB) plus the additional externality benefits. The Pareto efficient equilibrium is E" which corresponds to Q" vaccinations. A free market will thus under-provide vaccinations and this in turn will impose a cost upon society. This cost is shown in the diagram by the shaded area E'FE", which equals the excess of MSB over the cost of producing the further Q" – Q' vaccinations.

"Selfish" versus "caring" externalities

Some economists refer to this type of externality as a 'selfish' externality to distinguish it from a 'caring' externality. A 'caring' externality occurs when individuals receive benefit from knowing that other people are receiving medical treatment. Knowing that someone is in pain simply because they cannot afford medical treatment makes many people upset. In other words, the poor sick person's pain and lack of treatment causes disutility for other people in society.

People are prepared to make charitable donations to fund medical care for others because they gain utility from helping others.

This helps to explain also why some people are prepared to pay higher taxes to fund health care for all. Again a market demand curve reflecting each individual's wish to buy care for themselves is unable to express this willingness to pay for external benefits. So a free market will further under-provide health care.

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vii. Equity and health care

Should she only get a new hip if she can afford to pay for it?

More than efficiency

Efficiency is not everything. We are also concerned with what is fair. If we had a market distribution of health care, then only those who could afford to pay would be able to purchase it. Most people regard that as unacceptable. This is a major reason why most societies regard health care as different from other commodities. As Donaldson and Gerard put it:

"Within most societies there exists, in some form or another, a concern that health care resources and benefits should be distributed in some fair or just way"

A concern about equity was one of the main motivating forces behind the creation of the National Health Service (NHS) in the UK. William Beveridge, the architect of the welfare state, argued for a health service which would provide treatment "to every citizen without exception, without remuneration limit and without an economic barrier at any point to delay recourse to it". Equity has remained a major goal within the UK system.

What happens abroad?

A concern about equity has also been reflected by other countries' approaches to health care. McGuire, Henderson and Mooney have pointed out that the introduction of public health insurance in Canada in 1971 "was explicitly stated to be motivated by a concern to make health care utilisation less dependent upon income". While Blewett has suggested that in Australia "The introduction of Medicare in February 1984 was designed to ensure that all Australians have access to medical and hospital services on the basis of need". Even in the US, which has the most market orientated health care system in the developed world, the state intervened to provide Medicare and Medicaid to help the poor afford health care.

Market versus State?

In practice the question is not a simple choice between a pure free market and a pure command system. Everybody agrees that health care markets fail to some degree and that there are equity considerations. But does this automatically mean society is better off with some sort of command allocation system where the State makes all the decisions? Government intervention also imposes costs and creates inefficiencies. For instance, management structures are often bureaucratic and inflexible, leading to outcomes which do not reflect consumer demand and which are wasteful.

viii. Questions and activities

Why not leave it to the market?

Activity

Why do most people believe that we cannot leave all health care to the market? See if you can discover the answer to this. You could construct a survey to find out what people think about the idea of health care being bought and sold like soap powder. Try to identify what people believe is different about health care. This information will help you understand some of the theory we are about to introduce. You will also need this information to carry out some of the other activities in the unit.

i. Market failure - an overview

Question

1. People over 16 can buy cigarettes legally (i.e. in a free market). They are making a consumption decision based upon their evaluation of the costs and benefits of smoking.

a) To what extent is their consumption decision based upon imperfect information? Why might this information be imperfect?

b) What might be the externality effects of smoking?

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Activity

Advertising is often defended on the grounds that it provides information for consumers. Take an area like smoking or alcohol and research the extent to which advertising informs or misleads consumers.

Questions

2. Look at the following information about the US and other health systems and then answer the questions.

* In the US there are around 700 different private health care insurers.
* It was estimated in 1997 that 43 million people in the US (16% of the population) had no medical cover.
    Researchers have found that there is a strong connection between low income, poor insurance and poor health.
* The US spends a greater proportion of its GDP on health care than any other developed economy (13.6% in 1998) and yet according to most of the health indicators used by the OECD is no more healthy than other countries.
* Countries like Australia, Canada, France and Germany have set up compulsory public health insurance schemes.

a) What might explain the connection between low income, poor insurance and poor health in the US?

b) What might explain the high proportion of GDP spent on health care in the US?

c) How might the public health insurance schemes avoid the problem of adverse selection?

3. Some economists believe that the information problems facing health care have been greatly exaggerated.

"The first question of health economics has always been simple: why not leave health care alone? Some say that it is too complex for buyers to understand, so that they would be ripped off by sellers in a free market. Perhaps they would - but so are buyers of time shares, hot dogs and jewellery. In any case, the complexity is hugely exaggerated. And even where it is not, a similar complexity does not stop a market operating in the servicing and repair of car engines" - Economist 1991

a) Think about your own experience of health care - do you think that the complexity is hugely exaggerated?

b) People buying a car or a computer are able to get the information they need to help them make a rational choice from specialist websites and magazines - do you think similar websites and magazines could overcome the information problems associated with health care?

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4. Explain how a free market in health care might cause problems for the control of infectious disease.

Type in your answer, then click here to compare your answer with our guide answer.

5. a) Does society receive externality benefits from all kinds of health care?

b) Analyse why the government might launch a health campaign to persuade people to drink less alcohol. Try to draw an externality diagram to illustrate your analysis.

Activities

Look at the data you collected in the survey in the earlier Activity on people's responses to buying and selling health care on a free market. Try to analyse the responses in terms of market failure.

Look at the data you collected in the survey in the earlier Activity on people's responses to buying and selling health care on a free market. Try to analyse the extent to which the people you surveyed were concerned about equity.

OHE

4. Health care in the UK

What kind of health care system does the UK have and how does it relate to the economic theory introduced in Units 2 and 3? Most health care in the UK is delivered by the National Health Service (NHS). So what is the NHS and how does it work?

The National Health Service - some history

Aneurin Bevan, who as Secretary of State for Health was responsible for setting up the new service in 1948.

The National Health Service was set up by the Attlee Labour government in 1948 following ideas initially set out in the 1942 Beveridge Report.

The then Secretary of State for Health, Aneurin Bevan was determined that everybody would have access to the health care they needed regardless of income. He believed that the best way to achieve this was to create a centralised, unitary system. This would have meant that all health care services would have been organised within a single, national service and that structure would have been controlled from the centre. However, opposition from the medical profession forced him to compromise and the structure of the service which emerged in 1948 reflected this.

OHE

The NHS - A command approach to health care?

In many respects the National Health Service represents a command solution to the problem of allocating health care.

On the production side, the state decides how much health care is to be produced and who is going to get it. The state is also directly involved with the production of health care. Most medical facilities such as hospitals are owned by the state and the people working in the NHS are employed by the state, either directly or as independent contractors.

Health care in the UK is almost totally financed out of taxation. 98% of the finance comes from general tax revenues. This means that people have no direct choice about whether they pay for health care or how much they pay. However, the other side of this is that all health care apart from charges for items such as prescriptions, eye checks and dentistry is free and available to all UK citizens who need it.

In the rest of this unit we look at how the NHS is organised and how well it works before looking in detail at the recent reforms of the service.

i. NHS organisation and structure

How is the system organised? The diagram below outlines the structure of the NHS in England since April 2002. The systems in the rest of the UK are similar but differ in numerous details.
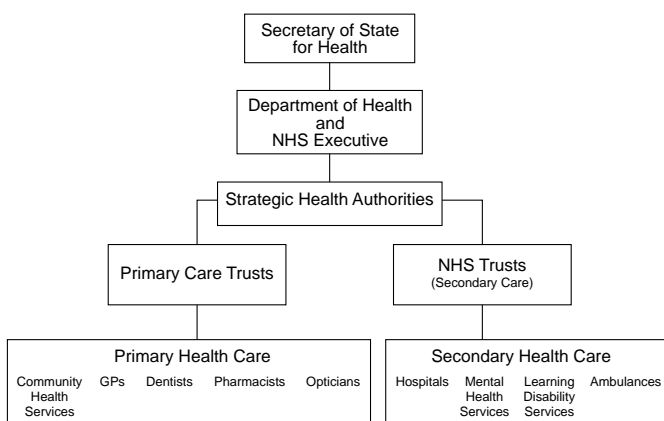
At the top is the Secretary of State for Health, the government minister in charge of the Department of Health, responsible for the NHS in England and answerable to Parliament. The Department of Health and NHS Executive are responsible for the strategic planning of the health service as a whole. Under the Department of Health are 28 Strategic Health Authorities which plan health care for the population of the region they cover.

Health services are divided between 'primary' and 'secondary'. Primary care services include general medical practitioners (GPs), dentists, pharmacists, opticians, district nursing and numerous other services. These are provided locally, near to where patients live, often in the local high street or even in patients' own homes. The more specialised services, which we use less often and are provided in fewer locations, are called 'secondary care'. This includes not only hospitals but also ambulances and specialised health services for the mentally ill and the learning disabled.

Services are provided by hundreds of NHS organisations called "Trusts". "NHS Trusts" supply secondary care. "Primary Care Trusts" provide primary care services. But they also have a second, very important role. Primary Care Trusts are responsible for buying almost all of the health care, both primary *and* secondary, required by the local poulation they serve. They are allocated funds each year by the Department of Health to do this and they must decide how much to spend on which health care services for the local population.

How does this system work?

Imagine that you are ill. You visit your GP who diagnoses your illness and if necessary either gives you a prescription or arranges for you to see a specialist at a hospital for a better diagnosis. You may then need to be treated in hospital either as a day patient or as an inpatient. Throughout this sequence you receive the medical care which the professionals – the GPs, hospital doctors and nurses, etc. – consider you need. In other words these health care professionals are acting as your agent to overcome the information problems we identified in Unit 3. But this means that the quantity and type of medical care produced is not normally influenced by your preferences or your willingness to pay – there is no market mechanism whereby your consumer demand can be expressed.

ii. Has the NHS been successful?

It is difficult to be objective about the NHS. Most people seem to feel passionately about it. Many believe as Bevan did that "no society can legitimately call itself civilised if a sick person is denied medical aid because of lack of means". In their view the NHS makes us a civilised society and they cannot speak too highly of the quality of the care and the dedication of the doctors and nurses.

Others take the view expressed by Jonathan Miller writing in the Sunday Times:

"It is an enduring eccentricity of the British that we regard our National Health Service as the envy of the world, despite the evidence staring us in the face of slum hospitals staffed by surly trade unionists (the doctors surliest of all) and run by vast legions of bureaucrats accountable to nobody, least of all the customers"

Positive achievements

The positive achievements of the NHS could be summarised as follows.

1.   The NHS is cheap by international standards. For example, the UK spent 7.1% of Gross Domestic Product (GDP) on health care in 2000, most of this on the NHS, while the average for the rest of the European Union (EU) in 1998 (latest data available) was 9.2% of GDP.

2.   The level of health in the UK is similar to that in other developed countries. For example, the life expectancy of a male in the UK born between 1990 and 1995 was 73.7 years whereas the average for the EU was 73.2 years. The corresponding figures for females are 79.0 years in the UK as against 79.6 in the rest of the EU.

3.   The NHS has avoided many of the problems of insurance based health care systems:

(a) Doctors are either salaried or under contract to the NHS. They are not normally paid a fee for service for NHS work. This has avoided over-supply problems (producer moral hazard and supplier induced demand, see Units 3ii and 3iii).

(b) Doctors decide who needs treatment. In particular GPs act as both a guide (to the appropriate specialist) and as a filter. This both helps overcome the problems of consumer ignorance and provides a means of controlling the level of demand.

(c) Since health care is funded by taxation and is free at the point of use, there are no gaps in the system and no stigma attached to receiving care.

(d) The budget for the NHS is determined centrally. The Secretary of State for Health negotiates with the Treasury and the decision is then ratified in Cabinet and voted on in Parliament. This budget determines the quantity of resources available for the NHS and thus provides a way of explicitly setting the maximum amount of health care that can be available to NHS patients as a whole.

4.   The NHS has continued to be popular. Klein has commented that "the NHS seems to be a remarkably successful instrument for making the rationing of scarce resources socially and politically acceptable".

Barr argues that the NHS has been successful because it has resolved many of the problems which face health care systems – "an institution which arose historically largely for equity reasons works because it goes with the grain of efficiency considerations".

Serious problems

What about the criticisms of the NHS? Many people believe that the NHS suffers from serious problems.

1.   The critics argue that insufficient resources have been devoted to health care so that there is less care than consumers would like. This is a consequence of funding the service from taxation - there is no mechanism whereby consumers can signal their willingness to pay more. According to this view the fact that the UK spends less of its GDP on health care than other developed countries reflects a weakness of the NHS rather than evidence of its efficiency. This also explains why the NHS appears to be in continual financial crisis - waiting lists, closed wards and an inability to treat particular patients or particular conditions all reflect a failure to devote sufficient resources to health care.

2.   The system is not sensitive to consumer preferences. Doctors have considerable independence or clinical autonomy. They make decisions about patients' treatment with little reference to either the patients or the managerial structure of the NHS. This has resulted in a system which is unwieldy and difficult to control and not responsive to consumer demand.

3.   The NHS is not as efficient as it could be. Some hospitals need to be closed and the resources transferred into community health care. But opponents, including some doctors, have successfully delayed, and in some cases prevented such changes from occurring. They argue that the closure of any hospital is a loss of NHS services regardless of how the resources made available may be used to provide other, more valuable, kinds of health care.

Local needs

The local people need care as well as those outside the city. Moving hospitals doesn't help the local community.

Local emergencies

Emergencies will now be taken 10 miles to the nearest hospital. Think what effect this could have on a heart patient or someone losing blood.

Local expertise

Why should expertise be concentrated in central hospitals that cannot be reached by the community? Keep the experts here where they trained.

Local beds

Visiting relatives will require at least a half hour journey. Come on, get real.

Say NO to closures

The need for a concentration of hospitals in London with a large number of acute hospital beds has passed.

iii. Reforming the NHS

NHS reforms

Since it was founded in 1948, the NHS has been subject to numerous reforms and reorganisations. The two most recent sets of major reforms were those started by the then Conservative government in 1989 and more recently those started by the Labour government in 1997.

The single most important feature of the 1989 Conservative reforms was the decision to introduce some elements of a market allocation system into the NHS. This 'internal market' divided the health service into providers and purchasers of health care. Purchasers received funds from the government with which to buy the health services that their local population would require. Providers negotiated contracts with the purchasers: providing those services for an agreed sum of money. Both purchasers and providers were NHS organisations. Both were ultimately responsible to the Secretary of State for Health.

The 1997 Labour reforms changed various features of the NHS and introduced new bodies such as the National Institute for Clinical Excellence (NICE), which is discussed in Unit 4iv. The split between purchasers and providers has been retained. But the emphasis since 1997 is less on market forces and more on cooperation between organisations.

The two sets of reforms had similar aims.

Government objectives

1. To improve the government's ability to control the output of the NHS and its cost.

In practice this meant making doctors more accountable to government. Management and control has been a problem since the foundation of the NHS. The heart of the problem was the retention of clinical autonomy by doctors. This meant that no-one was allowed to question the doctors' decisions or their judgement apart from their professional peers. This made it difficult, if not impossible, to set performance targets for doctors or to restrict excessive use of medicines and other health services.

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2.   The government wanted to improve the efficiency of the NHS. This involved improving both productive efficiency and allocative efficiency (see Unit 1). Productive efficiency requires the NHS to produce the maximum possible health care from the resources allocated to it. This means not just using resources to produce existing treatments as efficiently as possible but also switching resources to new more efficient treatments as they become available (this is sometimes called technical efficiency).

Allocative efficiency involves making sure that the NHS is supplying the type of health care – treatments, operations or medicines – which consumers want and also ensuring that the correct quantities, i.e. the quantities which consumers want, are produced.

How were these reforms expected to work? Put simply, the government hoped that market disciplines allied to a more streamlined command structure would both bring the medical profession under control and improve efficiency.

Market discipline and the NHS - efficiency

Markets are, in theory, Pareto efficient (see Unit 1). The government hoped that by introducing some market discipline into the NHS through the internal market then efficiency must improve. Specifically, it hoped that by separating the providers from the purchasers there would be a mechanism whereby inefficient providers would lose customers and either close or change their practices to become more efficient and hence more competitive. Money would follow patients and so the efficient, flexible producers would be rewarded with extra revenue. This should encourage the NHS Trusts both to minimise costs and to switch to new efficient methods of treatment as they become available.

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What about allocative efficiency? Traditionally the NHS has not been responsive to consumer demand. In fact, its ability to ration consumers' demand for health care has been seen as one of its advantages by some economists. Some observers believed that the introduction of GP fundholders would change this. It would allow consumers to express their preferences for a range of hospital and community health services by transferring their GP registrations. So if you were unhappy about the range of health care offered by your GP then you could switch to another GP. Since GPs' incomes reflect the number of patients on their list, this would, in principle, exert a market discipline upon the doctors to provide the care consumers want. In practice, patients are generally reluctant to change their GP, so the market discipline this provides is weak.

Equity

One major equity issue was the fear that introducing market forces within the NHS would lead to "cream skimming", that is "the deliberate selection of patients both by hospitals and by fundholding practices who were easier or less costly to treat in order to protect budgets".

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However, no evidence has been found to suggest that this has been a problem. This may reflect the fact that the NHS continues to be managed as a public service rather than as a system where financial targets come before 'needed' health care.

iv. Rationing and cost effectiveness

As part of its 1997 NHS reforms, the Labour government created the Nationanal Institute for Clinical Excellence (NICE). The main purpose of NICE is to advise doctors and everyone else in the NHS about the effectiveness and cost effectiveness of treatments. NICE produces large quantities of guidance. A glance at NICE's website http://www.nice.org.uk will give a quick idea of its outputs.

A controversial part of NICE's work is its appraisal of whether particular treatments are cost effective, that is whether they produce sufficient benefits to be worth the cost to the NHS. Benefits include improved quality of life for patients, including relief from pain and disability, as well as increased length of life. Quality and length of of life are often measured together in QALYs, which are discussed in Unit 5 of this e-source.

If a treatment is cost effective in NICE's view for a group of patients, then NICE will recommend its use throughout the NHS in England and Wales (the Health Technology Board of Scotland performs a similar function to NICE but for Scotland; Northern Ireland does not have an equivalent body). This is what makes NICE controversial.

The government hopes that this will increase the total health care benefits gained from the money the NHS spends. The government also hopes that NICE's work will gradually bring an end to what is referred to in the press as 'postcode prescribing'. This is where some treatments, especially prescribed medicines, are available from the NHS if you live in certain parts of the country but not if you live in others. The problem arises because NHS funds are inevitably limited, so that not all services can be provided that might be demanded by consumers (who under the NHS do not have to pay for them when they use them). This means that the NHS has to limit, or 'ration', the range and volume of services it makes available. NHS purchasers in different parts of the country currently choose to buy slightly different mixes of health care for their local populations. Hence 'postcode prescribing'.

NICE represents an explicit attempt to introduce economic considerations into the allocation of NHS resources, in addition to medical judgements. It remains to be seen whether NICE achieves what the government expects of it.

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v. Questions and activities

Questions

1. The following sequence outlines how the different parts of the NHS are likely to be involved with Susan's pregnancy:

• She visits her GP who gives her a check-up and then arranges for her to visit a hospital for a scan and other ante-natal checks.
• She then, in consultation with her GP, chooses a hospital for the birth.
• As her pregnancy develops her progress is monitored by both her GP and the doctors and midwives in the Maternity Unit of the hospital.
• For the birth itself, she spends a couple of days in the hospital Maternity Unit.
• After the birth parents and child would be visited at home by a community nurse and would themselves visit the local Child Welfare Clinic at intervals.

a) This sequence has involved many of the different elements of the NHS - identify those elements.

b) Who is making the decisions in this process?
Susan strongly wants to have her child at home but the doctors at the Maternity Unit refuse to allow this, arguing that the risk of complications is too high.

c) How could their decision be justified (think of the market failure theory we introduced in Unit 3)?

d) Do you think that Susan should be allowed to pay to have the birth she wants at home?

Type in your answer, then click here to compare your answer with our guide answer.

2. Why does the NHS not suffer from either moral hazard or adverse selection?

Type in your answer, then click here to compare your answer with our guide answer.

3. GPs have sometimes been called the gatekeepers of the NHS. How does their role as gatekeepers act to minimise the information problems consumers face with health care?

Type in your answer, then click here to compare your answer with our guide answer.

4. a) Why do waiting lists occur in the NHS? Are they necessarily a sign that the NHS is failing?

b) What is likely to happen to waiting lists in the future. Refer to the data in the appendix for your answer.

Type in your answer, then click here to compare your answer with our guide answer.

Activities

A1. Use the data in the appendix to decide whether you think that the NHS has been successful. You might use some of the data to plot your own graphs and look for trends.

iv. Rationing and cost effectiveness

A2. Use newspapers to research recent cases of health care rationing.

A3. Collect as many newspaper articles as you can on recent decisions published by NICE and carry out your own evaluation of its impact on the efficiency – both productive and allocative – and equity of the NHS.

5. Health care - further questions

Our analysis so far has largely concentrated upon the organisation and delivery of health care - the market versus planning. In this unit, we are going to examine and question some of the assumptions behind this analysis. For example, we have assumed that it is possible to obtain the information needed to assess efficiency and that health care and health are effectively the same thing.

Information and economic efficiency

All our discussions of economic efficiency have assumed that we can obtain accurate information about health care inputs and outputs. Without such information, it is impossible to tell whether marginal costs equals marginal benefit or whether the output is being produced for the lowest possible cost. In practice, this information can be very difficult to obtain.

i. Measuring treatment effectiveness

The most basic information we need is about the effectiveness of measures to cure or prevent illness. In particular, we need to know whether a specific treatment works. Is it effective in curing the illness? We also need to know how a treatment performs comparatively. Looking at different medical treatments for the same condition, which treatment produces the desired output for the least input?

Florence Nightingale recognised the importance of this more than a century ago and she bemoaned the lack of effective information available then:

"I have applied everywhere for information, but in scarcely an instance have I been able to obtain hospital records fit for any purpose of comparison".

Collecting evidence

Information about the effectiveness of different medical treatments can still be difficult to obtain. It was not until the 1960s that epidemiology started to produce effective data on a wide range of causes of ill health (such as smoking) and treatments. Increasing numbers of randomised controlled trials (RCTs) have been undertaken over the last 50 years and have shown that many treatments thought to be beneficial were in fact ineffective and some were positively harmful. For instance, it has been shown that there is no medical gain in admitting patients with acute coronary heart disease to hospitals with coronary care units. Once they have had initial treatment for their heart attack, subsequent treatment can be delivered equally effectively at home.

Without such effectiveness information it is impossible to evaluate the efficiency of health care provision. However, this problem can be overcome. Information about treatments can be obtained. All we need is more RCTs. But information about health care outcomes needs to consider quality of life as well as length of life and this is much more problematic.

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ii. Quality and quantity

Quality as well as quantity

How do we measure the outcome of a medical treatment? Any medical treatment is intended to improve the health status of the patient receiving it. If we take an aspirin to treat a headache, we expect the aspirin to remove the pain and thus make us feel more healthy. This means that measuring health care outputs must involve defining and specifying what we mean by health. In practice, health is usually defined negatively as the absence of illness or disease. However, this ignores the positive aspects of being healthy. The definition of health used by the World Health Organisation (WHO) tries to capture these positive aspects, defining health as:

"A state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity".

This means that we need to include a measure of quality of life when we are evaluating health care outcomes.

Measuring quality of life

What quality of life?

For instance, suppose we are trying to evaluate the use of chemotherapy for patients suffering from liver cancer. We are likely to find that the treatment can extend life by a number of months or years. That by itself would suggest that the outcome is beneficial. However, if we also found that there is considerable pain and unpleasant side effects, in other words that the quality of the extra life is very poor, then we may revise our assessment.

So to measure health care output, we need to measure both quantity and quality of life produced. Measuring quantity is fairly straightforward. We can use RCTs to compare how long people live following treatment with how long people with the same illness live who receive either no treatment or a different treatment. So we can measure the output of different treatments in terms of life years saved. Measuring quality of life is much more difficult.

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Disability Distress	None	Mild	Moderate	Severe
No disability	1.000	0.995	0.990	0.967
Slight social disability	0.990	0.986	0.973	0.932
Severe social disability and/or slight impairment of performance at work. Able to do all housework except very heavy tasks	0.980	0.972	0.956	0.912
Choice of work or performance at work very severely limited. Housewives and old people able to do light housework only but able to go out shopping	0.964	0.956	0.942	0.870
Unable to undertake any paid employment. Unable to continue any education. Old people confined to home except for escorted outings and short walks and unable to do shopping. Housewives able only to perform a few simple tasks	0.946	0.935	0.900	0.700
Confined to chair or to wheelchair or able to move around in the house only with support from an assistant	0.875	0.845	0.680	0.000
Confined to bed	0.677	0.564	0.000	−1.486
Unconscious	−1.028			

Table 3. Grading quality of life relative to perfect health (= 1.000).
[Source: Kind, Rosser and Williams in Jones-Lee, The value of life and safety, 1982.]

Grading states of health

One approach is to construct a table like Table 3 on the left. We then need to grade the states of health according to how good or bad they are thought to be. Clearly the grading will be subjective (normative) and so will vary from individual to individual.

There are a number of different ways in which the grading could be carried out. One is to rank the states of health without any attempt to quantify them – so you simply list the states in order of preference. Another is to try to quantify the utility or disutility involved in each state so that you can say that state 1 is not only better than state 2 but how much better it is. This is technically called a cardinal interval scale. An example of a cardinal interval scale with which we are all familiar is a thermometer. The interval scale has two reference points against which all other states can be compared - the reference points of a Celsius temperature scale are the freezing point and boiling point of fresh water at sea level i.e. 0 degrees C and 100 degrees C. Health measurement scales normally use good health = 1 and death = 0. In the example in Table 3, being confined to bed and in severe pain (distress) is considered to be worse than death.

Look at Questions and Activities for an exercise on measuring quality of life. Now look at the next section on QALYs to see how health economists have tried to create a measure to capture both the quality and quantity elements of a health care outcome.

iii. QALYs

What is a QALY?

Economists have attempted to capture both the quality and quantity elements of a health care outcome in a single measure by developing the QALY - which stands for quality adjusted life year. For instance, researchers used the matrix illustrated in Table 3 to construct estimates of QALYs gained by different treatments of phenylketonuria (PKU). This is an inherited disease which affects patients' digestion. They found that treating new-born infants affected by PKU with a special diet would improve health by 47.3 QALYs - a dramatic improvement.

QALYs offer the possibility of carrying out effective cost benefit analysis and thus providing the information we need to make efficient decisions (Table 4). The National Institute for Clinical Excellence (NICE) collects evidence on the cost per QALY produced by the treatments it appraises (see Unit 4iv). Some "life-saving" treatments are unpleasant, do not extend life much and the time remaining is full of pain and discomfort, while other treatments may not save lives but are not expensive and considerably improve the quality of life of the patient. An efficient allocation might shift resources from the first type of treatment to the second.

Problems with QALYs

QALYs provide the best attempt so far to solve the problem of measuring health care outcomes but they still suffer from a number of serious problems. A key question is who is to make the subjective choices which determine the QALY? Is it health professionals, the general public or patients who have experience of the particular medical condition and treatment? Experiments have shown that the value of a QALY can change radically according to who is making the choices. Other problems include the fact that the responses given are to hypothetical situations and so may not accurately reflect people's real decisions, and the fact that valuations are influenced by the length of the illness and the way in which the questions are asked. Finally, QALYs are likely to undervalue health care because they do not capture the wider benefits (externalities) which may be gained, for example, by a patient's family and friends.

Developing QALYs and extending RCTs promises to provide the information we need to judge whether health care is being produced efficiently or not. A more fundamental question is whether health care is really that vital for health?

Table 4

Treatment	£s Cost/QALY
Cholesterol testing and diet therapy	280
Advice from GP to stop smoking	350
Heart pacemaker implantation	1,420
Hip replacement	1,520
Coronary artery bypass graft	2,700
Kidney transplant	6,080
Breast cancer treatment	7,460
Heart transplant	10,110
Continuous ambulatory peritoneal dialysis	25,630
Neurosurgery for brain tumour	139,040

Source: Mason, Drummond and Torrance, British Medical Journal, 27 February 1993.

iv. Does health care make us healthy?

Diet is a key influence on health.

At first sight this might seem to be rather a strange question. If health care did not make us healthy why would we demand it? Clearly most people believe that there is a strong and positive link between the two – we demand health care because we want to be healthy and we believe that health care will make us healthy. But are we correct?

One way of finding out is to use data on life expectancy at birth to gain a picture of how and why health has changed historically. A man born in 1841 in England and Wales could only expect to live 40.2 years and a woman 42.2 years, but by 1998, a man's life expectancy had increased to 75.1 years and a woman's to 80.0 years. These figures indicate a dramatic improvement in the general level of health over the period. Research has shown that this was mainly due to a reduction in infectious diseases carried by air, water and food – diseases such as tuberculosis, cholera and gastro-enteritis.

Why has the death rate fallen?

What caused the death rate from these diseases to fall so dramatically? Was it improvements in health care such as new drugs, better medical treatments and more doctors? These things helped but the main factors were improvements in nutrition and in hygiene. Better nutrition made people more able to fight disease with their bodies' own defence mechanisms, while improved hygiene due to proper sewage disposal, clean water and the development of techniques such as pasteurising for milk helped eradicate diseases carried by water and food. Health care played a relatively minor role in this process.

Diet and lifestyle

But surely modern medical techniques and the development of new operations and new medicines have changed this picture? Again the evidence suggests yes but not greatly relative to diet and other factors. Figure 13 on the left shows current statistics on deaths from ischaemic (coronary) heart disease from a range of countries. If the quantity and quality of health care was a key variable then one would expect relatively poor countries such as Portugal to perform worse than relatively rich countries such as Norway. In fact the main variable appears to be diet. Countries at the top of the heart disease league all tend to be large consumers of dairy products and saturated animal fats while those at the bottom of the table tend to use vegetable oils and eat large quantities of fruit and vegetables.
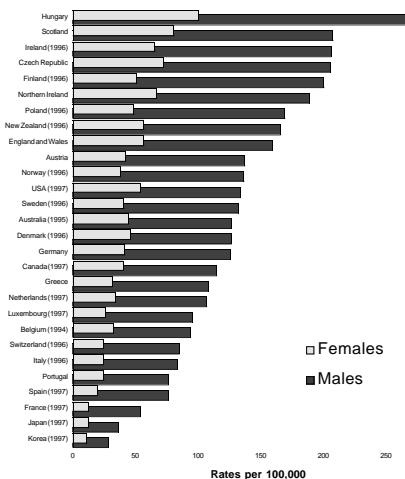
Note: Year is 1998 unless stated otherwise.
Source : OHE calculation based on WHO Mortality Database (WHO).

Figure 13. Deaths from ischaemic heart disease.

Smoking is also a major factor. In the UK generally, coronary heart disease and cancers are the main killers, together accounting for approximately half the deaths from natural causes in England and Wales in 1995. Coronary heart disease and cancer are strongly associated with smoking. Heavy smokers (over 40 cigarettes a day) are four times as likely to die from coronary heart disease as non-smokers, moderate smokers twice as likely, while 40% of all cancer deaths and 90% of lung cancer deaths are due to cigarette smoking. So if we want to be healthier, perhaps we should change our diet and give up smoking rather than visit our doctor and demand health care.

Modern health care

In fact, this misses the point of much modern health care. Most treatment provided by doctors and hospitals is not concerned with saving people's lives. Modern developments in medical technology, surgical techniques and medicines have enabled doctors to treat many conditions which previously caused patients considerable pain and discomfort.

For instance, stomach ulcers can now be controlled and managed by modern drugs. This helps to explain why the demand for health care seems to be infinite – everybody wants improvements to the quality of their life.

So we are still faced with the problem of deciding how much health care we should have. Some people argue that we can never have too much – we should aim for the highest level of health care provision possible. But this is to confuse health – a basic human right – with health care. As we have seen, health care is, in most cases, just like any good or service which gives consumers utility. If this is the case, then the optimum level of health care will be the efficient level – the quantity where marginal cost equals marginal benefit. This will give us the maximum satisfaction from our scarce resources. The questions that remain are those which we have discussed throughout this e_source – which mixture of market and planning will produce the most efficient allocation and how should the health care which is produced be distributed between different people (equity)?

People are now able to have their hips replaced which both removes pain and gives them renewed mobility.

v. Questions and activities

Questions

ii. Quality and quantity

1. Look at the health measurement matrix below. The vertical axis describes states of disability while the horizontal axis describes the level of distress the patient is experiencing. What do we mean by the level of distress? The term distress is an attempt to capture both the physical and mental effects of being ill. This is very subjective but severe distress might mean considerable, continuous physical pain with perhaps a high level of anxiety and fear. Each combination on the matrix needs to be given a numerical score so that a cardinal interval scale is created. The reference points are healthy = 1 and dead = 0.

Disability Distress	None	Mild	Moderate	Severe
No disability	1.000			
Slight social disability				
Severe social disability and/or slight impairment of performance at work. Able to do all housework except very heavy tasks				
Choice of work or performance at work very severely limited. Housewives and old people able to do light housework only but able to go out shopping				
Unable to undertake any paid employment. Unable to continue any education. Old people confined to home except for escorted outings and short walks and unable to do shopping. Housewives able only to perform a few simple tasks				
Confined to chair or to wheelchair or able to move around in the house only with support from an assistant				
Confined to bed				
Unconscious				

a) Complete the matrix using your own values based on your own personal preferences. Each number should be to no more than three decimal places, e.g. no disability/ no distress will score 1.000, while confined to bed/mild distress might score 0.564. Try to be as consistent as possible. The scores are likely to reflect your own personal experiences – particularly experiences of illness. Note that it is possible to have a negative score if you feel a particular combination of disability and distress is worse than death. Fill in the table, then click here to see the values that researchers got.

b) Compare your scores with others in your group and discuss why different people have come to different conclusions.

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2. Researchers have estimated the marginal cost per QALY to be gained from a number of health procedures. Hip replacement surgery will produce one QALY for £1,520 while gaining one QALY from screening for breast cancer will cost £7,460 (Mason, Drummond and Torrance, 1993).

a) How might society re-allocate resources between hip replacement surgery and screening for breast cancer to achieve a more efficient outcome? (Remember that the most efficient allocation of resources is when the marginal cost paid is equal to the marginal benefit or utility received).

b) Why might many people be unhappy with this?

Type in your answer, then click here to compare your answer with our guide answer.

Activity

iv. Does health care make us healthy?

A1. Use the data in the appendix to look for evidence that improvements in health in the UK have been due to factors other than health care.

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Appendix. Statistics

i. UK population trends

ii. The aging UK population

iii. Life expectancy

iv. Birth rates and child mortality

v. NHS pay and prices

vi. NHS cost by age group

The Office of Health Economics (OHE) produces a compendium of statistics on a wide range of data relating to health care in the UK. The compendium is available on CD ROM or in printed format. We have selected six sets of data that are particularly relevant here. Each data set is presented as a table and a graph and is also available for download in CSV (comma separated variable) format, allowing it to be used in a spreadsheet.

i. UK resident population trends

Note: *projections from 2001 are based on 1998 mid-year estimates.

Sources:
Annual Abstract of Statistics (ONS)
National population projections 1998-based (ONS)
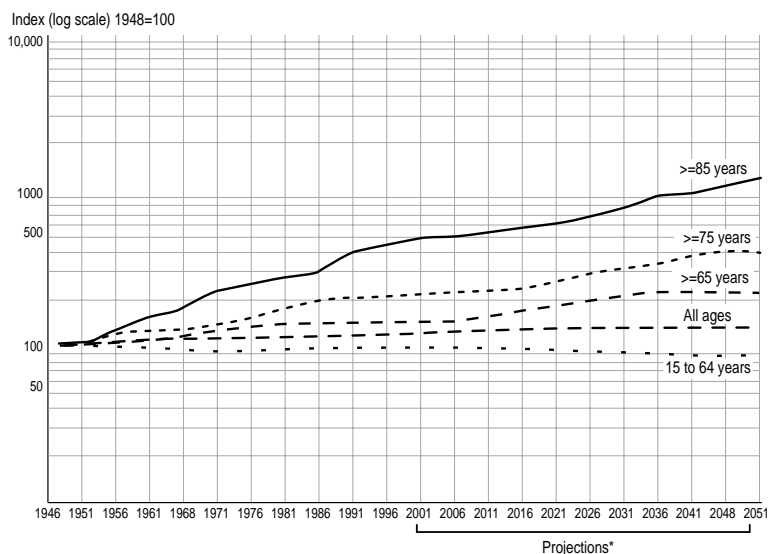
Year	All ages	15 to 64 years	Over 65 years	Over 75 years	Over 85 years
1948	100.0	100.0	100.0	100.0	100.0
1951	101.6	98.7	102.8	105.9	100.0
1956	104.0	97.3	105.6	117.6	125.0
1961	106.9	96.1	109.3	123.5	150.0
1966	110.9	95.7	113.1	126.5	175.0
1971	113.2	92.9	123.4	138.2	225.0
1976	113.8	93.3	132.7	150.0	250.0
1981	114.2	95.5	141.1	173.5	275.0
1986	115.0	97.5	143.0	191.2	300.0
1991	117.0	96.6	146.7	202.9	400.0
1996	119.0	96.4	147.0	209.7	453.6
2001	121.4	97.4	146.0	218.2	489.3
2006	123.4	99.0	144.0	221.5	503.3
2011	125.4	99.2	154.4	225.4	542.3
2016	127.6	97.3	169.5	234.8	574.3
2021	129.8	95.4	178.6	257.0	614.6
2026	131.6	93.8	192.5	294.4	671.2
2031	132.7	91.1	211.5	313.3	775.5
2036	133.2	89.5	225.4	341.6	923.8
2041	133.3	89.4	228.5	381.3	969.2
2046	132.9	89.7	227.3	405.8	1071.9
2051	132.3	89.4	227.9	401.3	1223.7

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ii. The aging UK population

Note: *projections from 2001 are based on 1998 mid-year estimates.

Sources:
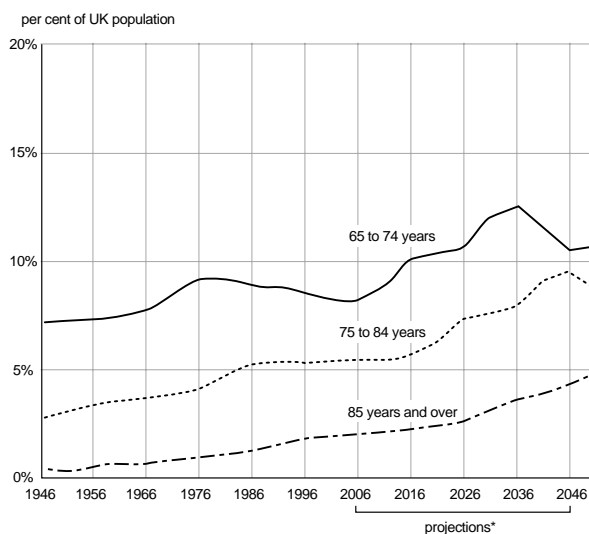Annual Abstract of Statistics (ONS)
Population Trends (ONS)
National population projections 1998-based (ONS)

per cent of UK population

Year	65 to 74 years	75 to 84 years	Over 85 years
1948	7.2	2.9	0.4
1951	7.3	3.1	0.4
1956	7.4	3.4	0.6
1961	7.5	3.6	0.7
1966	7.8	3.7	0.7
1971	8.5	3.9	0.9
1976	9.1	4.2	1.0
1981	9.2	4.7	1.1
1986	8.8	5.3	1.3
1991	8.8	5.4	1.5
1996	8.6	5.3	1.8
2001	8.2	5.5	2.0
2006	8.2	5.5	2.0
2011	8.9	5.5	2.2
2016	10.1	5.7	2.3
2021	10.4	6.3	2.5
2026	10.6	7.3	2.7
2031	12.0	7.6	3.1
2036	12.5	7.9	3.7
2041	11.5	9.1	3.9
2046	10.5	9.5	4.3
2051	10.7	8.8	4.9

Growth of UK elderly population as a percentage of total UK population
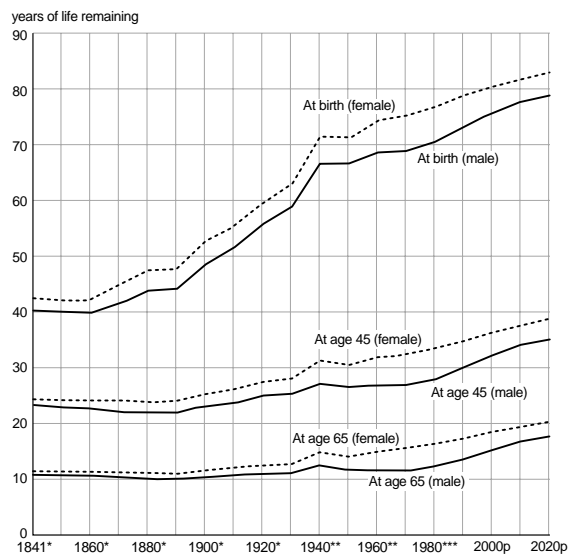
iii. Life expectancy in England and Wales

Notes:
p = 2000-based population projections
* Figures are based on English Life Tables
** Figures are based on Abridged Life Tables
*** Figures are based on future lifetime

Source:
Government Actuary's Department

Year	At birth (male)	At birth (female)	At age 45 (male)	At age 45 (female)	At age 65 (male)	At age 65 (female)
1841*	40.2	42.2	23.3	24.4	10.9	11.5
1850*	39.9	41.9	22.8	24.1	10.8	11.5
1860*	39.9	41.9	22.8	24.1	10.8	11.5
1870*	41.4	44.6	22.1	24.1	10.6	11.4
1880*	43.7	47.2	22.1	24.1	10.3	11.3
1890*	44.1	47.8	22.2	24.2	10.3	11.3
1900*	48.5	52.4	23.3	25.5	10.8	12.0
1910*	51.5	55.4	23.9	26.3	11.0	12.4
1920*	55.6	59.6	25.2	27.7	11.4	12.9
1930*	58.7	62.9	25.5	28.3	11.3	13.1
1940**	66.4	71.2	27.4	31.5	12.8	15.3
1950**	66.5	71.2	26.8	30.7	12.0	14.4
1960**	68.3	74.1	27.3	32.2	12.2	15.4
1970**	68.8	75.1	27.2	32.7	12.0	16.0
1980***	70.4	76.6	28.3	33.7	12.8	16.8
1990***	73.2	78.7	30.3	35.1	14.0	17.8
2000p	75.6	80.3	32.6	36.6	15.7	18.9
2010p	77.6	81.7	34.4	37.8	17.3	19.9
2020p	78.8	83.0	35.4	39.0	18.2	20.9

Years of life remaining

iv. Trends in birth rates and child mortality

Source:
Population Trends (ONS)
Annual Abstract of
Statistics (ONS)

Rates per 1000 population (log scale)

Infant deaths (per 1000 live births)

Live births

Crude death rate

Childhood mortality (aged 1 to 14)
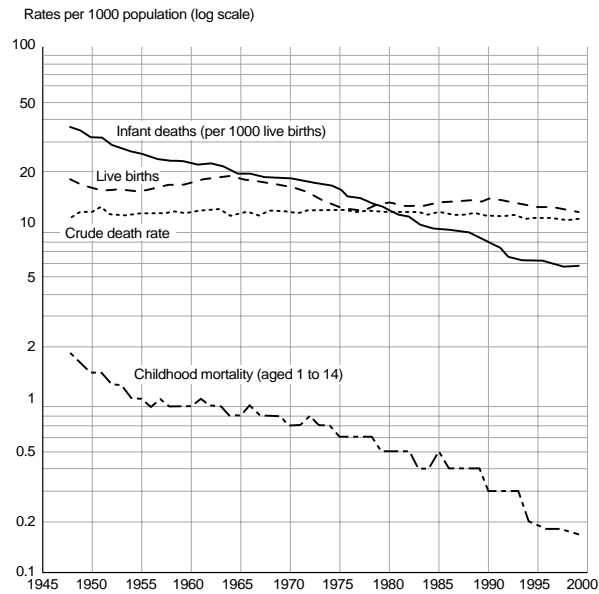
| Year	Live births	Infant deaths per 1000 live births	Crude death rate	Childhood mortality (aged 1 to 14)
1948	18.1	36.0	10.9	1.8
1949	17.0	34.1	11.7	1.6
1950	16.2	31.2	11.7	1.4
1951	15.8	31.1	12.5	1.4
1952	15.7	28.8	11.4	1.2
1953	15.9	27.6	11.4	1.2
1954	15.6	26.4	11.3	1.0
1955	15.4	25.8	11.6	1.0
1956	16.0	24.4	11.6	0.9
1957	16.5	24.0	11.5	1.0
1958	16.8	23.3	11.7	0.9
1959	16.9	23.1	11.7	0.9
1960	17.5	22.5	11.5	0.9
1961	17.9	22.1	11.9	1.0
1962	18.3	22.4	11.9	0.9
1963	18.5	21.8	12.2	0.9
1964	18.8	20.5	11.3	0.8
1965	18.4	19.6	11.6	0.8
1966	18.0	19.6	11.8	0.9
1967	17.6	18.8	11.3	0.8
1968	17.2	18.7	11.9	0.8
1969	16.7	18.6	12.0	0.8
1970	16.3	18.5	11.8	0.7
1971	16.2	17.9	11.5	0.7
1972	14.9	17.5	12.0	0.8
1973	13.9	17.2	11.9	0.7
1974	13.2	16.8	12.0	0.7
1975	12.5	16.0	11.9	0.6
1976	12.1	14.5	12.1	0.6
1977	11.8	14.1	11.8	0.6
1978	12.3	13.3	11.9	0.6
1979	13.1	12.9	12.0	0.5
1980	13.4	12.2	11.8	0.5
1981	13.0	11.2	11.7	0.5
1982	12.8	11.0	11.8	0.5
1983	12.8	10.1	11.7	0.4
1984	12.9	9.6	11.4	0.4
1985	13.3	9.4	11.8	0.5
1986	13.3	9.5	11.6	0.4
1987	13.6	9.1	11.3	0.4
1988	13.8	9.0	11.4	0.4
1989	13.6	8.4	11.5	0.4
1990	13.9	7.9	11.2	0.3
1991	13.7	7.4	11.3	0.3
1992	13.5	6.6	11.0	0.3
1993	13.1	6.3	11.3	0.3
1994	12.9	6.2	10.7	0.2
1995	12.5	6.2	10.9	0.2
1996	12.5	6.1	10.9	0.2
1997	12.3	5.8	10.7	0.2
1998	12.1	5.7	10.6	0.2
1999	11.8	5.8	10.6	0.2
2000	11.4	5.6	10.2	0.2

v. NHS pay and prices

Notes:
* United Kingdom GDP at market prices.
** Figures relate to Hospital and Community Health Services in England.

Sources:
Economic Trends (ONS)
NHS Executive Finance Directorate (DoH)
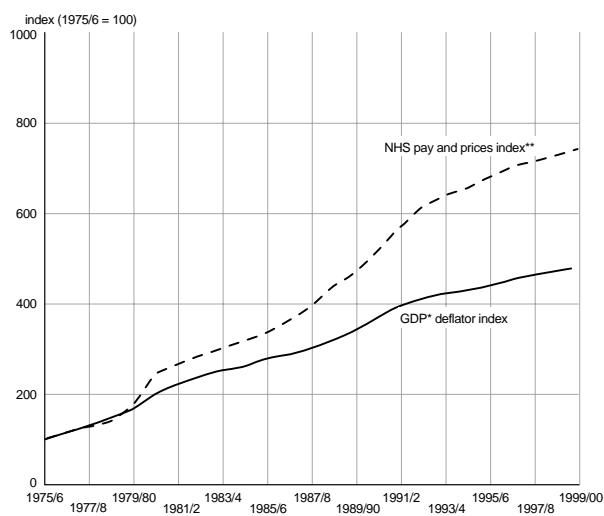
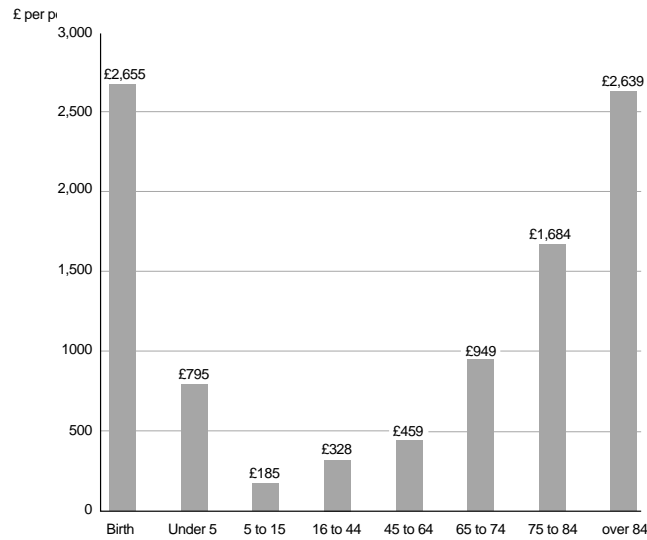| Year	GDP deflator index 1975=100	NHS pay and prices index
1975/6	100	100
1976/7	115	116
1977/8	131	127
1978/9	147	140
1979/80	168	177
1980/1	200	245
1981/2	223	267
1982/3	240	286
1983/4	252	301
1984/5	264	320
1985/6	279	336
1986/7	288	361
1987/8	303	395
1988/9	321	442
1989/90	344	472
1990/1	371	517
1991/2	396	575
1992/3	412	617
1993/4	423	639
1994/5	430	656
1995/6	441	683
1996/7	456	703
1997/8	468	715
1998/9	480	745
1999/00	492	780

vi. NHS cost by age group

Estimated HCHS per capita expenditure by age group, England, 1996/97

Notes:
HCHS = Hospital and
Community Health Services.

Sources:
The Government's
Expenditure Plans 2002/03
to 2003/04 (DoH)

£ per p
3,000

2,500

2,000

1,500

1000

500

0

£2,655   £795   £185   £328   £459   £949   £1,684   £2,639

Birth   Under 5   5 to 15   16 to 44   45 to 64   65 to 74   75 to 84   over 84

Age Group	£ per head
Birth	2655
Under 5	794
5 to 15	185
16 to 44	328
45 to 64	459
65 to 74	949
75 to 84	1684
over 84	2639

Estimated HCHS per capita expenditure by age group, England
1999/00