

ASSESSMENT OF COSTS IN HEALTH CARE

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Adapted from Dr. Rimal Mousa presentation

Learning objectives

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- To identify, measure, and value the types of costs used in economic evaluation
 - Define different types of health related costs
 - Understand how costs can be estimated
 - Understand the different types of costs

- To provide an example calculation

Key points from the previous lecture

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- There are **limited resources** and thus health systems can not afford all health care interventions
- Health economics can aid decision making
- Health economics is comparative, weighing the costs and benefits.

Introduction

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- Economic evaluations are tools that health economists use to assess the cost-effectiveness of health care interventions.
 - An economic evaluation is about comparing the cost and outcome of alternative treatments
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- They consist of two components:
 - inputs (costs)
 - outputs (benefits)

Assessing health interventions/services

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□ Input

□ Costs

- Space
- Computers & equipment's
- Time of health care providers

Health
services/interventions

**e.g. employing a
clinical pharmacist**



output

Consequences

- Prevent medication errors
- Prevents readmission and ED visits
- Shorten length of hospital stay
- Better quality of life

Costing Analysis

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The cost analysis involves identifying, measuring, and valuing resources.

- **Identify:** What are the resource use categories needed to be estimated (Based on the perspective)
- **Measure:** How much of each resource is required (How to estimate these resource categories will be based on the data source available)
- **Value:** to attach a unit costs to each resource categories to estimate the total cost

Total costs

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- Total costs represent resource use **quantity** consumed multiplied by its **unit cost**
- Unit costs are the price of each unit of resource.
 - i.e. cost of medication pack such as Tamoxifen
 - i.e. cost of one surgical procedure

Try this

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- Determine the cost associated with the pharmacist time providing patient discharge education services?.
- Knowing that
 - The pharmacist spent on average 15 min per patient
 - The cost of pharmacist time per hour is 25 JDs

Answer: $15 * 25/60 = 6.25$ JD per patient

Examples of Unit cost

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- Pharmacist time (25 JD per hour)
- First year resident (35 JD per hour)
- Dietary Specialist time (20 JD per hour)
- Hospital bed (216 JD per day stay)
- Medicine (10 JD per tablet, 25 JD per vial, 15 per 50 ml bottle)
- Operation room (500 JD per hour)

Total Cost

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- Total cost: cost of producing a particular quantity of output.
 - 500 JDs to prevent 12 cases of pneumonia
 - 1000 JDs to detect 10 cases of early stage breast cancer

Total cost of production = Fixed costs+ variable costs

It is necessary to know which costs are **fixed** and which are **variable** before you can start to work out the true production costs of a product, or how much it costs to deliver a service.

Costs

1. Direct

Direct **medical** costs:

- Fixed cost
 - ▣ Capital cost
 - ▣ Overhead costs
- Semi-fixed cost
- Variable cost

Direct **non-medical** costs

2. Indirect medical costs

3. Intangible costs

Direct costs

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Direct costs are the cost associated directly with the health care intervention and they include medical and non-medical costs

Direct medical costs:

Costs **incurred by the health service** and it include

- **Fixed costs:** Incurred whether patients are treated or not
- **Capital cost:** Cost associated with setup the service including building an operating room or purchasing an large equipment.
- **Overhead costs:** Cost associated with running the service including light, heat, or water supply.

Direct costs

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Fixed costs do not vary with the quantity of output in the short run (about 1 year). However, it varies with time, rather than quantity.

- **Variable costs:** Cost associated with treating patients and it varies with the level of output, i.e. number of patients treated .
E.g. drug, tests, disposable equipment.

Check your understanding

You are the production manager in a Jordanian manufacturer. You ought to propose to JDFA a reasonable price for a generic paracetamol syrup you are producing.

- The costs are:

1 Ton of Paracetamol powder = 200 JDs to produce 2000 bottle

1 tank of water = 50 JDs

2000 glass bottle = 20 JDs

Production line (include machines) = 300 JDs

1. Which of these variable or fixed costs?

2. What is the total production cost?

3. What would be a reasonable price to propose?

Answers

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- Production line is fixed, others are variable costs
- Total production cost= 570 JDs
- Cost per bottle = $570/2000 = .28$ JD



The selling price would be the above plus profit.

Direct costs

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Direct non-medical costs:

Cost incurred by the patient

patients' out-of-pocket expenses (e.g. travelling costs from and to hospital, parking expense, baby sitting)

Indirect costs

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Incurred by the reduced productivity of a patient, and their family, resulting from illness, death or treatment.

- time off work due to sick leave
- early retirement
- reduced productivity at work
- Morbidity costs: that are incurred from missing work i.e. lost productivity
- Mortality costs: that are incurred due to premature death

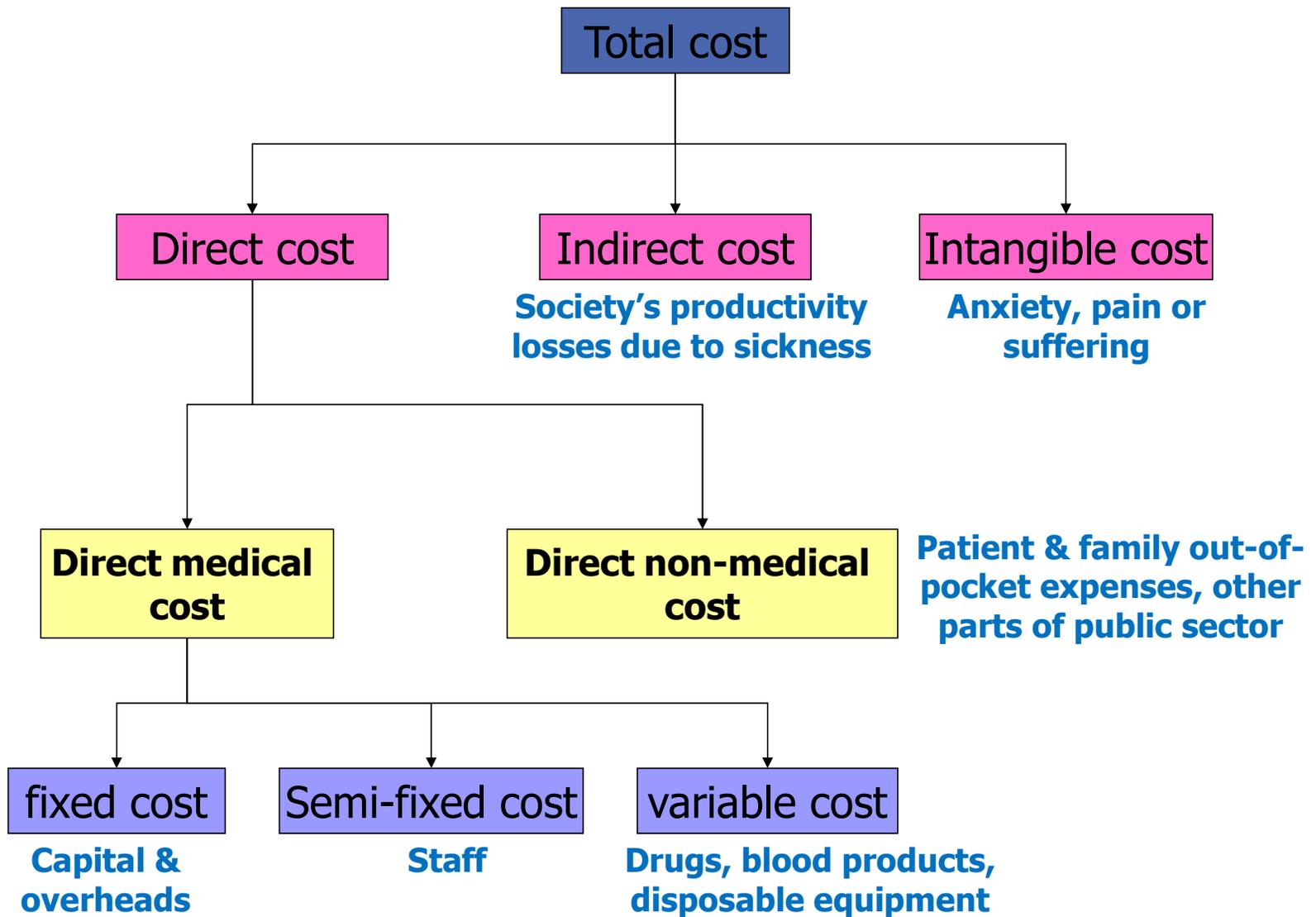
The indirect cost has its great impact if the disease affecting the working aging group.

Intangible costs

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Cost resulted from anxiety, pain or suffering from an illness or from a treatment.

Difficult or “impossible” to attach a monetary value but it might be captured in the quality of life (QoL)



Costs associated with prescribing a Medicine

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- Acquisition cost (direct cost)
- Transportation cost (direct non-medical cost)
- Supply management cost (i.e., storage facility cost) (direct fixed cost)
- Cost of supplies and equipment to administer medicines, such as syringes and needles (direct variable cost)
- Personnel costs to prepare and administer such as physicians, pharmacists, and nurses (semi-fixed cost)
- Other direct costs (e.g., ADRs, hospital room charges, laboratory fees)

Opportunity cost

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Opportunity costs reflect the fact that choices have to be made between interventions because of the scarcity of resources.

It can be used to explain the consequences of choosing between two alternatives.

e.g. Imagine we have a choice of two effective treatments, A and B, but only enough money for one of them.

If treatment A is funded rather than treatment B, **the opportunity cost of funding A is the benefits we forgo in not choosing B; the next best alternative use of the resources.**

Opportunity cost

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We need to be sure that spending money on the new therapy will buy more benefit than spending that money in some other part of the health care system.

Example: Two possible interventions: a cancer screening program (intervention A) and the next best alternative, a smoking cessation program (intervention B). Only one of these interventions can be funded within the available budget.

- The opportunity cost of funding A can be thought as the benefits that would have been gained through the smoking cessation program.

Opportunity cost

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Opportunity cost: the value of the forgone benefits because the resources are not available for its best alternative use

If a resources are used to purchase a program or treatment, then the opportunity to use it for another purchase is lost.

Opportunity cost

- We should be less concerned with how much a health care intervention costs, but rather with what other benefits we are giving up by using the money in that way.
- Opportunity costs is not always an actual cost but represent the value forgone or saved as a result of selecting once service/intervention.

Incremental cost:

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Difference in overall costs between running a service and not running it or comparing different health care intervention or programme.

- ▣ This includes comparing the difference in fixed and variable costs between different health care programme

Incremental cost:

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e.g.

- Additional costs of spending a week in Canada rather than staying home
- The additional administration cost for cartridge vs. penfill form of a medicine (assuming that the fixed and other variable costs are similar between both forms)

Average cost

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An **average cost**: total cost of therapy divided by the total quantity of treatment units provided (cost per unit of treatment)

marginal costs

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- **Marginal cost** is the Cost of treating one more patient by carrying out one more intervention or one extra test (in case of screening).
- This will include only the variable costs.
- The change in total costs resulting from a marginal change in activity.
- The cost of producing one extra unit of activity, e.g. one more test; treating on more patient.

Average vs. marginal costs.

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No. patients	Total cost (£)	Average cost (£)	Marginal cost (£)
10	4000	400	0
20	5000	250	100
30	6000	200	100
40	6800	170	80
50	7400	??	??

Answers: 148 and 60

Example calculation

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Pharmacy Based Cholesterol Screening Service

Fixed costs:

renovation of screening area:	£5000
screening machine	£1200
training costs	£1500

Variable costs:

pharmacist's time screening	£2 per patient
Reagents	£0.50 per patient
disposable equipment	£0.50 per patient



Example calculation

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- What are the fixed costs for setting up the screening service? £7,700
- What are the variable costs for screening 1000 patients over a year?
 $£3 * 1000 = £3000$
- What are the total costs to the pharmacist of setting up and running the service for one year (assuming 1000 patients are screened)?
 $£7,700 + £3000 = £10,700$



Example calculation cont.

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- What is the average cost of screening a patient over this first year?
 $10,700/1000 = \text{£}10.70$
- What is the marginal cost of screening the 1001th patient? £3



Costs can be described in many ways

- Cost / unit (cost/tab, cost/vial)
- Cost / treatment
- Cost / person
- Cost / person / year
- Cost / case prevented
- Cost / life saved
- Cost / DALY (disability-adjusted life year)

Keep this in your mind for next time

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- Costing methods are common to all types of economic evaluations
- However, the range of costs is determined by the **perspective** of the analysis.

Measuring the Benefits (outcomes) of Health

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Benefits, outcomes and consequences refer to the effect on the patient, not the effect on people providing the service.

The principal outcome categories used in economic evaluation are:

- effectiveness
- quality of life
- Utility
- expressing benefits as monetary values (Willing to pay)

Outcomes

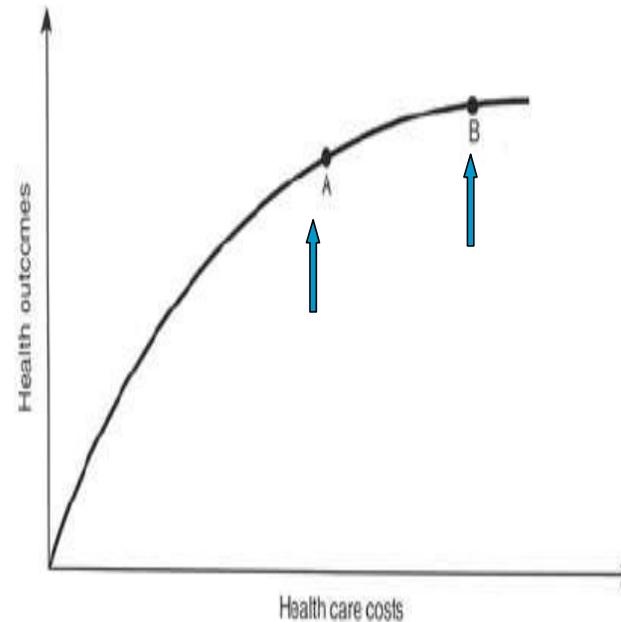
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- Both positive and negative outcomes should be addressed
- Positive outcomes: drug's effectiveness, cure of disease, disease prevention, QALY,.....
- Negative outcomes: treatment failure, nosocomial infection, malpractice,.....

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Health care **COSTS** and Health **outcomes**

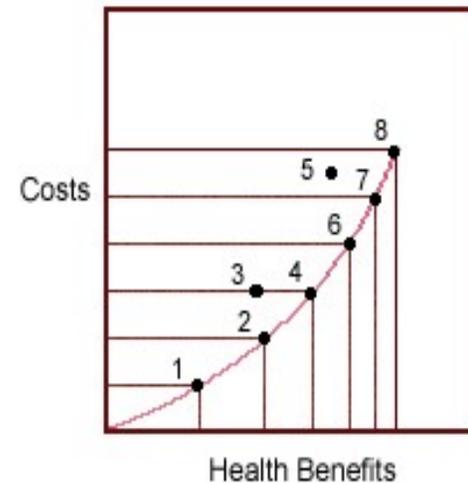
- Initially, as health care resources increase, these outcomes improve,
- but above a certain level, the slope of the curve diminishes, signifying that increasing investments in health care yield more marginal benefits.



Health care **COSTS** and Health **outcomes**

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- A small investment of resources to create more sanitary water supplies and to administer inexpensive hydration therapy yielded dramatic improvements in health.
- On the other hand, Large investments of resources in new technologies may produce more marginal and difficult - to - measure improvements in the overall health of a population.



Market Failure

- A **free market** is a market in which prices of goods and services are arranged completely by the mutual consent of sellers and buyers, determined generally by the law of **supply and demand** (with no government interference).

Market Failure

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- **Perfect competition:**
 - perfect information
 - many buyers and sellers
 - a uniform product
 - freedom of entry and exit

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Market Failure

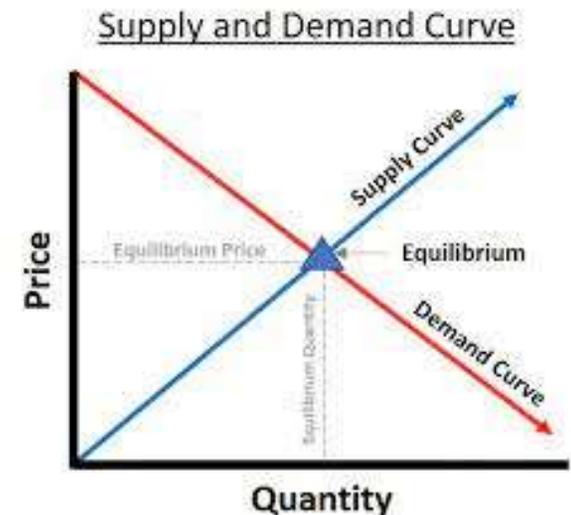
- In theory, markets produce the goods and services we want in the right quantities and at the lowest possible cost. This is why markets are so powerful.
- But in the real world markets do not always work in the way theory predicts. It is possible for a free market to produce market failure.

DEMAND AND SUPPLY

In a market economy , output is distributed through a system of prices.

Each good and service produced is sold to those who are willing and able to pay the market price.

The market demand for a good or service is presented as a schedule which relates the number of units (quantities) that will be purchased at alternative prices, holding constant other variables that influence the purchase decision.



DEMAND AND SUPPLY Cont...

Change in market demand is a shift in the market demand curve that results from:

- ✓ a change in the number of consumers in the market
- ✓ consumer preferences
- ✓ consumer money income
- ✓ the price of a substitute commodity
- ✓ the price of a complementary commodity.
- ✓ a change in the number and or size of producers.
- ✓ a change in the technology
- ✓ a change in the price of a factor of production
- ✓ a change in the price of other commodities used in production.

Reasons of market failure in the health market

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1. The **asymmetry of information** between patients and health care providers.

If the health professional 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,

i.e. **supplier induced demand.**

Behaviors are controlled by the government through a **professional code** and a **system of licensure.**

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Reasons of market failure in the health market

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2. The existence of **public goods** with **positive externalities**

Some important health services, such as mass immunization, environmental health activities, health education and promotion, surveillance, control for communicable diseases at borders, etc., **are not profitable for private providers and are mainly provided by governments.**

Vaccination: not only benefit the vaccinated person, but also other people will gain because they are now protected against catching that disease from that person.

Reasons of market failure in the health market

3. **Adverse selection.**

This is practiced by private insurers not willing to enroll the old, the chronically ill and some vulnerable groups who are in greater need of social protection.

Governments usually intervene to compensate for the market's reluctance to ensure inclusion of the most vulnerable groups.

Reasons of market failure in the health market

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4. Moral hazard.

- Over-consumption of health services occurs when these services are free at the point of use to **patients**, particularly those who are insured.
- **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 escalates the **cost of health care** and leads to an inefficiently large quantity of resources being allocated to health care.
- Such behavior calls for cost-containment strategies and programs .

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Reasons of market failure in the health market

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5. Equity in health care.

In health care, 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.

This is a major reason why most societies regard health care as different from other commodities.

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Governments' role and market failure

1. Supply public goods that are not profitable for the private provider.
2. Increase health education and promotion so as to decrease consumer ignorance.
3. Make cost-containment strategies to combat moral hazard.
4. Compensate for the vulnerable groups by compensating for insurers adverse selection.
5. Ensure equity for all.

Governments' role and market failure

6. Prevent supply induced demand by making regulations to control medical procedures.
7. Activate laws of licensure and re-certification for health professionals.
8. Ensure efficiency through quality improvement strategies.
9. Develop pre-payment and insurance schemes to reduce moral risks and adverse selection.