

# Economics of Health and Education

Health as an economic good & production  
function of health

Rajshree Bedamatta

[rajshree@iitg.ac.in](mailto:rajshree@iitg.ac.in)

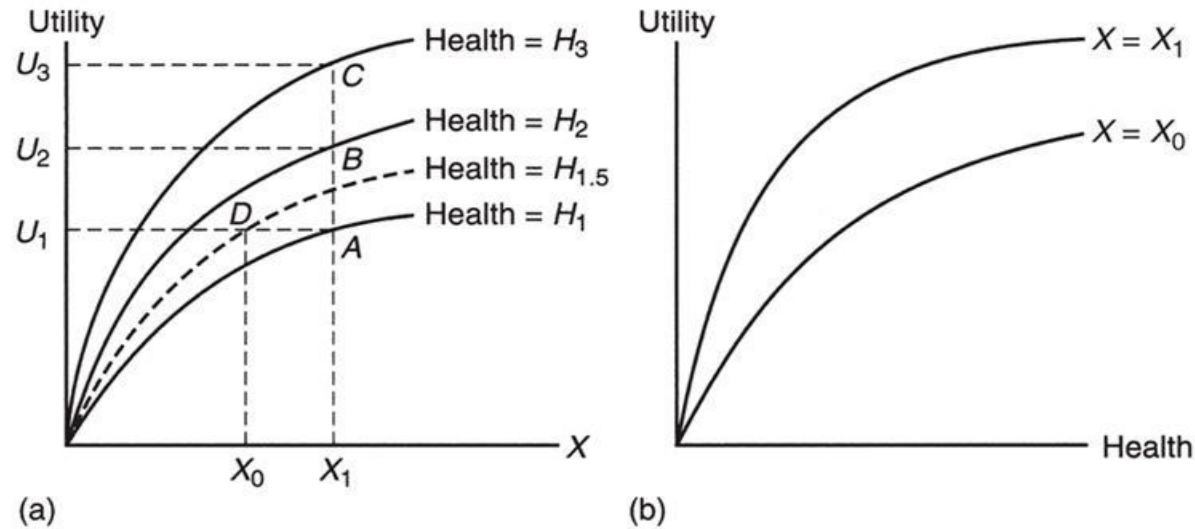
Department of Humanities & Social Sciences

Indian Institute of Technology Guwahati

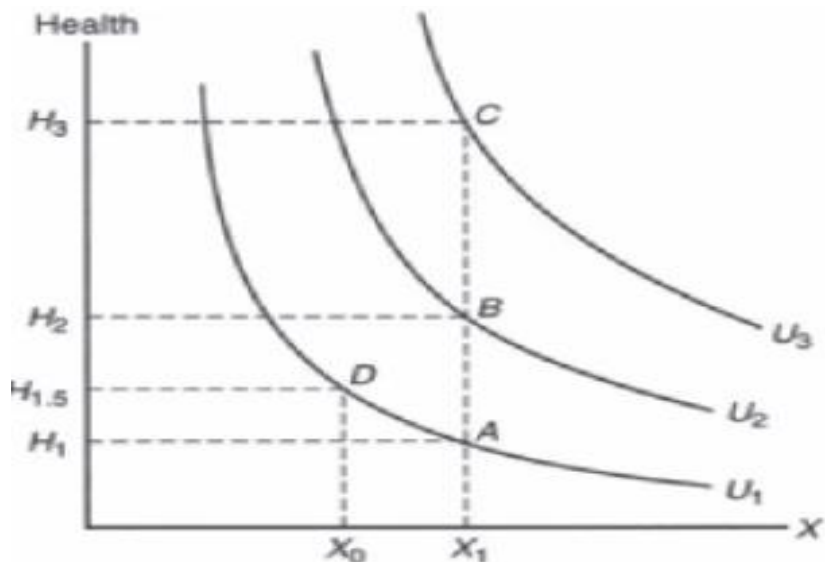
# Health as a durable economic good

- The most fundamental of all building blocks of consumer demand theory is that an economic “good” increases a person’s utility.
- Ill-effects of health are “bads”, however better health in itself creates happiness and in that sense we can think of health as an economic “good.”
- If we can think of a bundle of other goods as  $C$ , and a stock of health as  $H$ , then we can say that a person’s utility function is of the form
- *Utility =  $U(C, H)$  or  $U(X, H)$ ; where  $C$  and  $X$  are bundle of other consumption goods*
- With respect to goods, we usually say “more is better”, so more health creates more utility.

**FIGURE 2.1** (a) Increasing utility as a function of expanding goods. (b) Increasing utility as a function of expanding stock of health.



- These figures show that both  $X$  &  $H$  produce more utility as the consumption of each expands.
- Figure (a) shows a series of plots where utility grows with  $X$ , each having a different level of  $H$  associated with it. In other words,  $H$  is held constant at a specific value on each line.
- Figure (b) shows how  $H$  increases utility for a given  $X$ .
- We can then combine these two figures into one, for example, by picking some specific value such as  $X = X_1$ , and finding the level of utility associated with various values of  $H$  ( $H_1$ ,  $H_2$ ,  $H_3$ , etc.) at the points labelled A, B, and C.

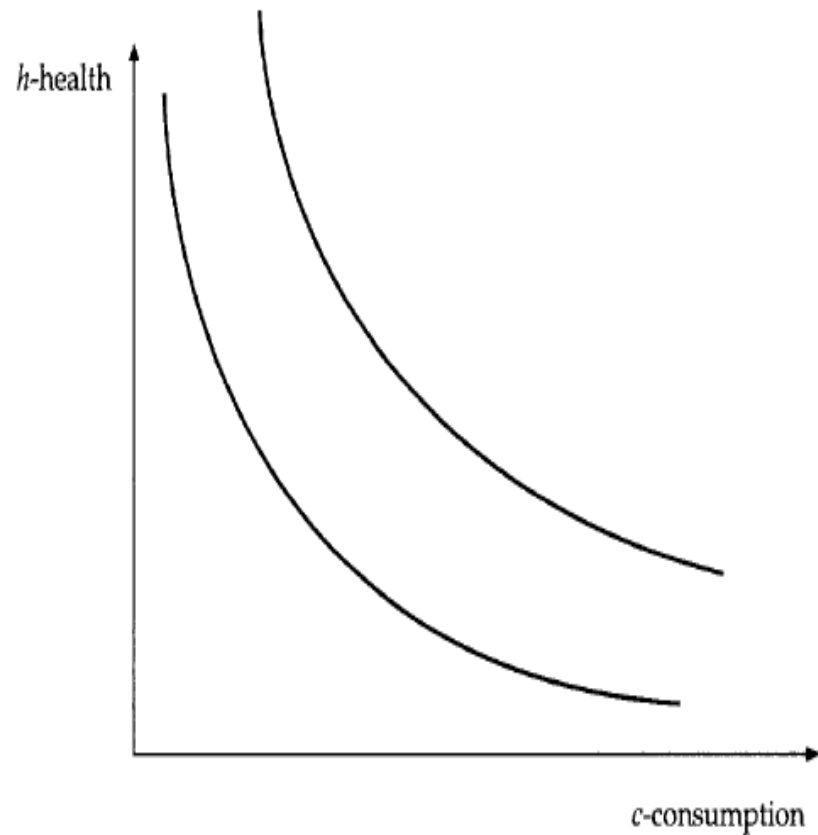


## Preferences for health and health care

Let us start with a very simple representation of preferences for health within a standard utility-maximizing framework.

1. Individuals use their available resources to acquire health.
2. To admit a substantive choice, individuals must have alternative uses for their resources.
3. Let us bundle all of these alternative uses into a generic consumption good, denoted by  $c$ .
4. Utility is then represented as a function  $u(c, h)$ , where  $h$  is the level of health;  $h$  is not the quantity of health care services consumed, but rather the level of health that the individual enjoys.
5. We assume that greater health and higher levels of other consumption make the individual better-off, and that an increase in one coupled with a decrease in the other leaves the individual's well-being unchanged.
6. We can draw standard indifference curves representing preferences between  $h$  and  $c$ .

# Indifference curves representing preferences over health and other consumption goods



How do we interpret the variable  $h$ ?

- We know when we are feeling healthy and when we are not, but can we really hope to quantify health levels using a particular unit?
- In some instances, a natural unit might suggest itself: a person with terminal cancer might measure her health in expected number of years of life (*notwithstanding the quality of life considerations involved here*).
- It will suffice however to keep aside the interpretation of  $h$  and use it only as a means to derive the (observable) demand for medical care services.
- If the social welfare implications of the allocation of health among individuals are thought to differ from those associated with allocation of ordinary goods, a quantifiable measure of  $h$  is necessary.

Let us consider how the simple description of preferences can be used to determine the demand for medical care.

1. We have assumed that medical care is desired only for its use in producing health.
2. Let us assume for now that the production process is very simple, that in order to produce an additional unit of health,  $\theta$  units of medical care are required.
3.  $\theta$  provides a natural index for the health status of an individual – the higher is  $\theta$ , the sicker the individual is.
4. Thus,  $h$  represents the level of health, and  $\theta$  represents the health status.

# The production of health

- It seems clear that we can produce health by taking recourse to “medical care.”
- What is medical care? They are a set of activities designed specifically to restore or augment the stock of health.
- Demand for medical care (or health care) is a **derived demand**.
- We can think about the process of transforming medical care ( $m$ ) into health ( $h$ ) as a form of derived demand.
- In economics, we define such a process as a **production function**.
- What is a production function? It is a relationship that transform inputs (such as medical care) into outputs (such as health).

## Production function

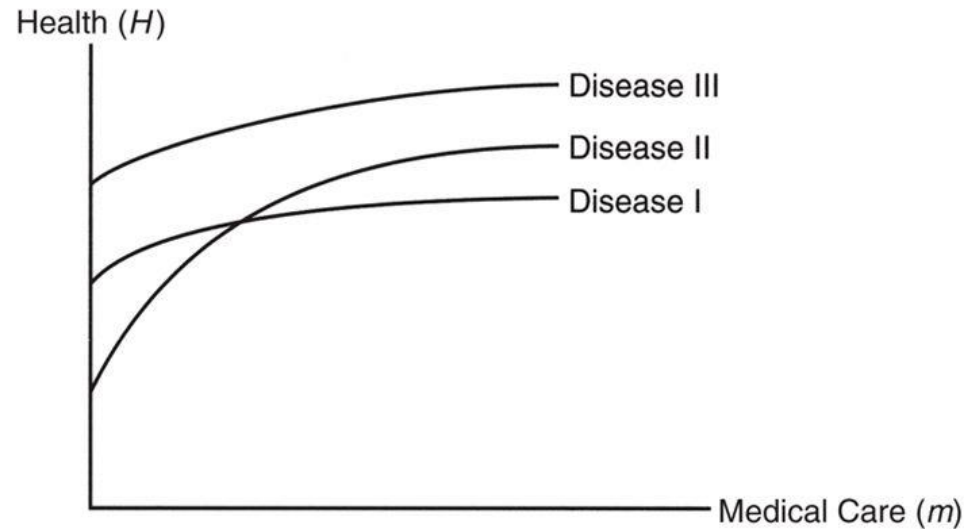
- Let us write a health production function of the form:  
 **$H = g(m)$ ; where  $m$  is medical care (input) and  $H$  is health (output) and  $g$  shows a functional relationship.**

We normally presume that more  $m$  produces more  $H$ ; meaning that marginal productivity of medical care is positive.

In keeping with commonly observed economic phenomena we can also presume that the incremental effect of  $m$  on  $H$  diminishes as more  $m$  is used and, after a while, may even become negative.



**FIGURE 2.3** Health production functions for three diseases.



- Health outcomes also depend on the disease a person has, as does the productivity of medical care.
- So, we can think of health as a function of both disease ( $D$ ) and medical care ( $m$ ), and the two interact. Thus, we can write a production function of the form:

$$H = g(m, D)$$

- Disease I curve starts at a point where let's presume that the individual is not terribly sick at the start (without medical care) but medical care offers some help in healing and eventually plateaus. (e.g. allergies, asthma)
- Disease II starts the individual out at worse health, but here medical care has more to offer and returns the individual to a higher level of health finally (e.g. elective surgery of the gall bladder stones)
- Disease III does not start the person out very sick, but medical care has limited ability to help, in the sense that level of health with not medical care is not much different from the level with a lot of care. (e.g. common cold)

## Discussion

- For almost every possible medical intervention, there reaches some point at which the incremental productivity (marginal productivity) of medical care will fall very low, or possibly even become negative. However, average productivity can be quite high. The production process for Disease II represents a good case – on average, medical care had done a lot of good, but it is possible to expand the use of  $m$  to the point at which its marginal product also falls to zero.
- The notation “ $m$ ” (describing medical care) as a homogenous activity is hugely simplistic. Thus, the “medical production function” must really be thought of as a collection of various medical interventions, each applying to specific diseases and injuries.
- Many medical interventions do not change the eventual level of health to which a person returns, but they can considerably speed up the process of “cure.”
- Finally we should remember that medical care alone does not stand alone in affecting health. The production process contains more than “medical care,” including, more prominently, our lifestyle.