Economics of Health and Education

Module 1: Microeconomic Foundations of Health and Education

Stock of health, education & health

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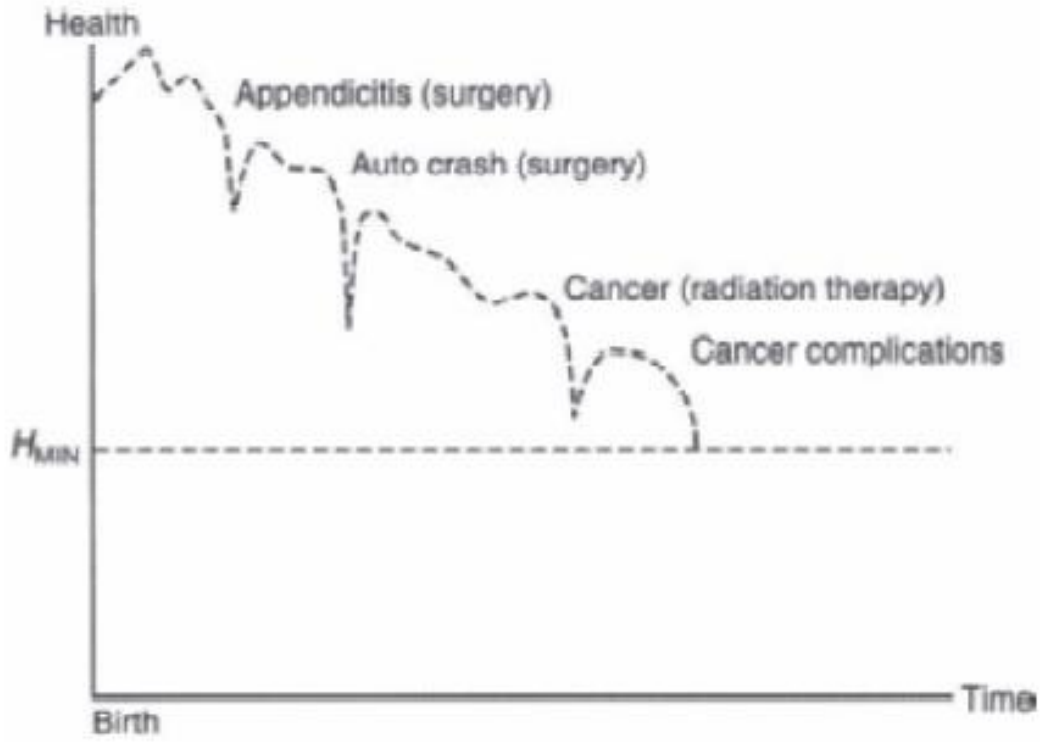
Health through the life cycle

- Ageing: like any durable good, our stock of health wears out over time.
- In economic terms, our stock of health depreciates.
- 'Normal ageing' as measured in our society represents the average rate at which this depreciation takes place. But we should recognize that there is nothing biologically intrinsic about this process.
- Life expectancy has increased dramatically in the last one century implying that the depreciation rate on people's stock of health has slowed down through time.
- Public-health efforts and individual medical care serve to slow down the depreciation of health, or to restore health to (or near) its original level after illnesses or injury.

Time path of health stock

FIGURE 2.4 Time path of health stock



- At birth we begin with a high stock of health. In other words, there is a steady increase of health stock during childhood.
- Gradual decline from aging punctuated by random illnesses and injury.
- At some critical H_{MIN} the person dies.
- Medical care forms an important part of the process of restoring health after such events, unless H_{MIN} has been reached.

Source: Charles Phelps (2018), Chapter 2, Health Economics

TABLE 1 Overall death rates by age

Age (years) in age group	*Aggregate annual death rate per 100,000 persons*			
	1985	1998	2007	2014
1–4	52	35	29	24
5–14	26	20	15	13
15–24	102	82	80	66
25–44	167	161	144	142
45–64	875	680	661	640
65–74	2,848	2,495	2,059	1,787
75–84	6,399	5,703	5,164	4,565
Over 85	15,224	15,111	12,947	13,408

- This table shows aggregate mortality rates by age interval for U.S. citizens.
- It portrays the decrease in stock of health associated with aging.
- This table also reveals the impact of technical (technological) change in health care.
- In a span of three decades, medical progress has dramatically reduced deaths, notably among children, young adults and the over-65 age groups. And much of this improvement, is due to technology, although not all of it.

Implication: Improvements in mortality rates in such a short period provide quite striking evidence on the consequences of improved medical care technology.

A model of consumption and health

- In addition to the random events of health care, many of the other things we do and consume during our lives affect both the rate of aging and the frequency and the severity of the "Spikes" (figure 2.1 in slide 3).

- Our own lifestyles can greatly contribute to our health.

- So the consumption bundle X can also interact with H in the production of health. Some of the X that we are consuming may be an "economic bad."

- So there are good types of X (X_G) that augment health; and there are bad types of X (X_B) in terms of their adverse effects on health. There may be some neutral types of goods (such as watching a movie in a hall) which may not have a direct impact on the health of an individual.

- So we can expand the production function to include these different types of X.

$$\boldsymbol{H = g(X_B, XG, m)}$$

$$\boldsymbol{where\ XB\ impacts\ the\ stock\ of\ health\ negatively};$$

$$\boldsymbol{X_G\ and\ m\ impact\ the\ stock\ of\ health\ positively}.$$

TABLE 2 Leading causes of death by age group, ages 5–24

		Ages 5–14	*Ages 15–24*
	Deaths/100,000	15.3	79.9
Cause		*Percent of deaths*	*Percent of deaths*
Accidents		35.7	46.8
Suicide and homicide		8.6	28.5
	Percent "violence"	44.3	75.3
Cancers		15.6	4.9
Heart disease		3.9	3.2
All others		36.2	16.6
Total		100.0	100.0

In this, and the following tables, note how the death rates (measured in deaths/100,000 persons in each age group) rise with age, slowly at first and then quite rapidly at older age groups. This shows the normal process of aging, or in economic terms, the rate of depreciation of the stock of health.

TABLE 3 Leading causes of death by age group, ages 25–44

		Ages 25–34	*Ages 35–44*
	Deaths/100,000	104.9	184.4
Cause		*Percent of deaths*	*Percent of deaths*
Accidents		35.2	21.3
Suicide and homicide		23.6	12.2
	Percent "violence"	58.8	33.5
Cancers		8.1	16.7
Heart disease		7.6	14.9
HIV disease		2.6	3.8
All others		22.9	31.1
Total		100.0	100.0

TABLE 4 Leading causes of death by age group, ages 45–64

		Ages 45–54	*Ages 55–64*
	Deaths/100,000	420.9	877.7
Cause		*Percent of deaths*	*Percent of deaths*
Cancers		27.2	35.9
Heart disease		20.3	22.8
Accidents		11.0	4.2
Suicide and homicide		5.4	2.0
	Percent "violence"	16.4	6.2
Stroke		3.5	3.7
Liver disease		4.4	2.8
All others		28.2	28.6

TABLE 5 Leading causes of death by age group, ages 65 and over

		Ages 65–74	*Ages 75–84*	*Age 85+*
	Deaths/100,000	2,011.3	5,011.6	12,946.5
Cause				
Heart disease		23.0	26.2	33.0
Cancer		35.6	25.1	12.3
Lower respiratory disease		7.4	7.4	4.6
Stroke		4.6	6.4	7.8
Diabetes		3.9	3.2	2.1
Alzheimer's disease		1.0	6.4	6.6
All others		24.5	25.3	33.6
Total		100.0	100.0	100.0

Significant observations

- The patterns of leading causes of death change in the various age intervals.
- In younger age groups, the leading causes of death are dominated by unintended accidents, suicide, and homicide, categories grouped together as “violent deaths.”
- As we move from younger to older age groups, deaths due to violent causes diminish rapidly, and biological causes emerge as the leading causes of death – cancer first in the middle age groups, followed by heart disease; and in the older age groups, heart disease followed by cancer.
- The key point is that as we move into older age intervals, all of the leading causes of death are heavily associated with lifestyle choices made earlier in life.
- Tobacco use, alcohol consumption, consumption of fatty foods top the list in the U.S.

Actual causes of death in the U.S. in 1990 and 2000

- 50 percent of all deaths were due to (arranged in order of lowest to highest share):

1. Illicit drug use
2. Sexual behaviour (transmitted diseases)
3. Firearms
4. Motor vehicle
5. Toxic agents
6. Microbial agents
7. Alcohol abuse
8. Obesity/lack of exercise
9. Tobacco

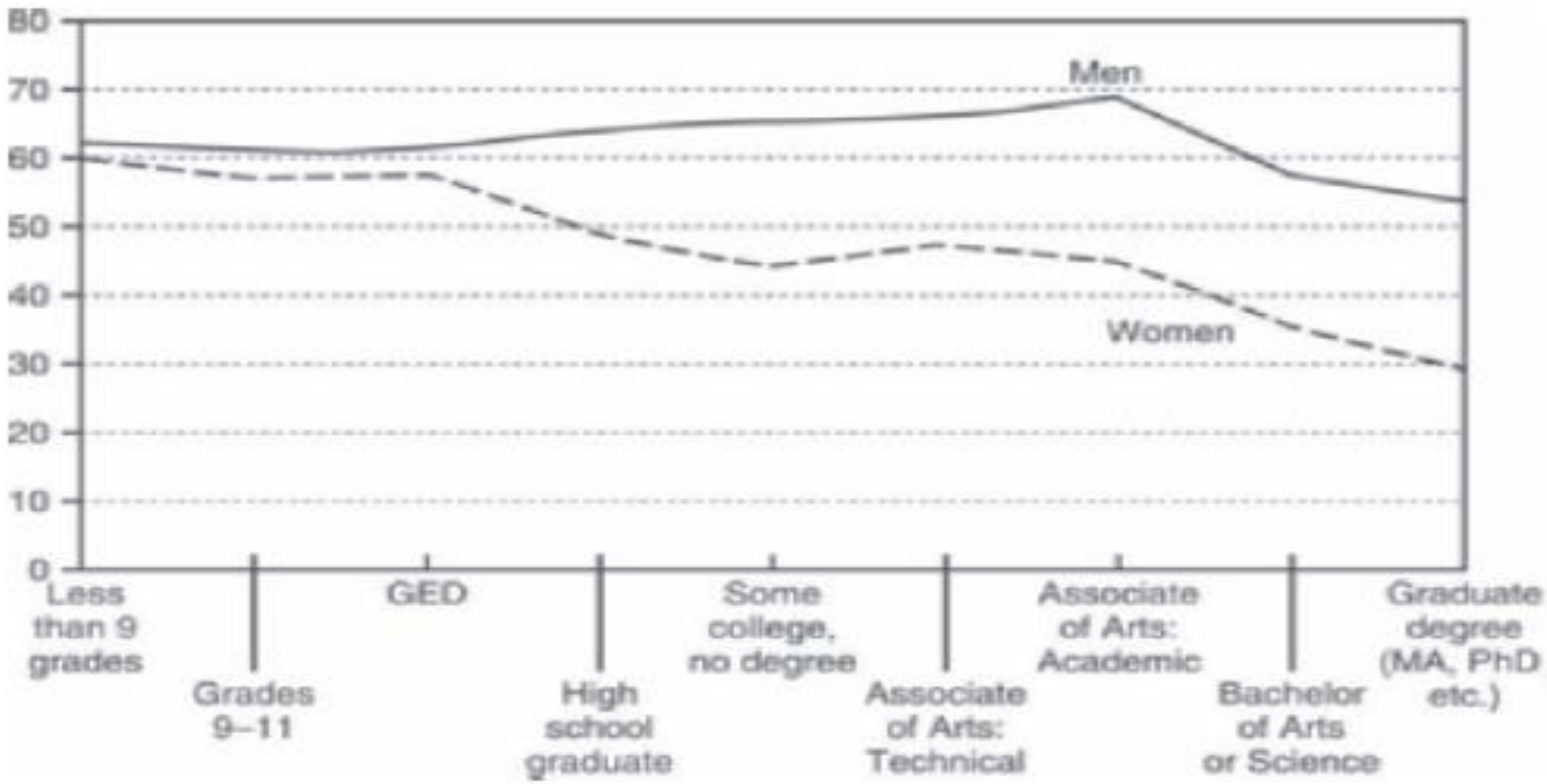
Education and health

- Seminal work by economists (eg. Grossman, 1972) have found positive associations between education and health outcomes.

- We can find not only links between education and the use of tobacco and alcohol that support the general notion that higher education increases health, but also the relationship in other health-affecting behaviours.

- Just as we find with respect to tobacco, obesity declines with education, particularly among women.

- Propensity to undertake regular exercise rises with educational level.


80
70
60
50
40
30
20
10
0
Men
Women
Less than 9 grades
Grades 9–11
GED
High school graduate
Some college, no degree
Associate of Arts: Technical
Associate of Arts: Academic
Bachelor of Arts or Science
Graduate degree (MA, PhD etc.)

Can we identify education as the cause of these health improvements?

- There may be fundamental differences in time preferences for different people. People with a high "discount rate" (those who prefer immediate pleasure rather than investing in future) will not only opt against investment in education, but will also engage in fewer health-producing behaviours.
- We have no clear way to identify whether the underlying mechanism really is "time-preference" or not, nor do we really have any good understanding of how time preferences are formed.
- The issue becomes further confounded when we introduce the effect of education on lifetime earnings. Education systematically increases people's productivity and hence how much they earn over a lifetime.
- The additional earning (due to education) power provides the ability for people to live in healthier and safer environments.
- But it also gives people the ability to purchase things that are less healthy (restaurant meals typically add more calories to people's diets than home-cooked meals).
- The problem becomes even more confusing when we consider the effects of health on earning power. For a given level of education, people who are healthier will be able to work more, and therefore their productivity higher. Therefore, earnings will be higher.
- People with chronic diseases are likely to suffer a lifetime earnings loss in addition to their physical discomforts.
- No matter how complicated the above matters, education and income have a clear positive association with health outcomes.