

# Health Economics

## The production of health

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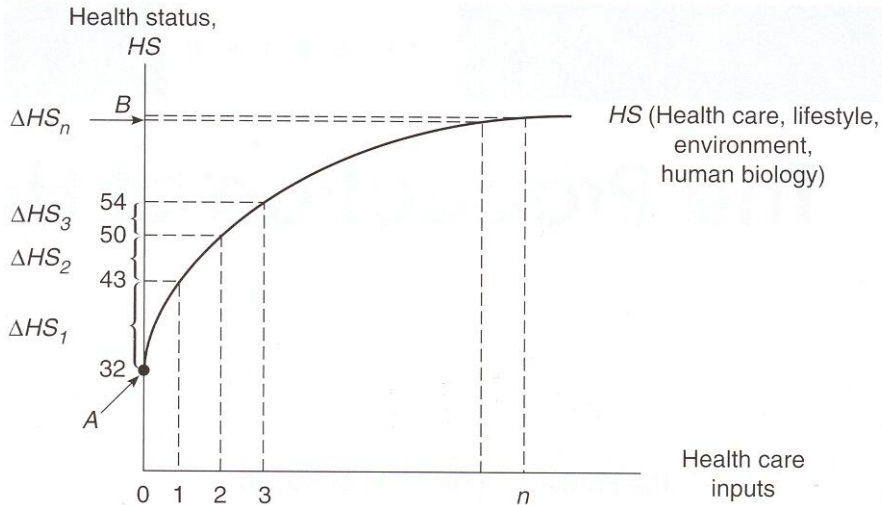
# The production of health

- What is the contribution of health care to the health status of the population?
- What is the best way to produce and distribute health care?

**Different features of life – not only health care – contribute to our health!**

- The production function of health
- The role of medicine and health care
- The importance of schooling

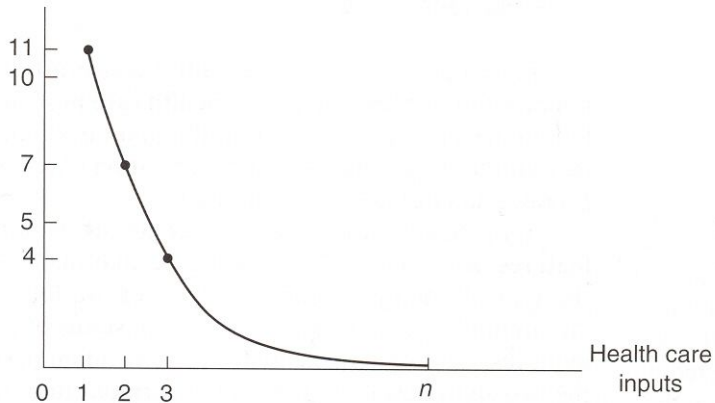
# Production function



A. Production Function of Health

# Marginal product and its importance

Marginal product  
of health care



B. Marginal Product of Health Care

# The historical role of health care and medicine

## Stylized facts

- Practitioner-provided medical interventions played a small role in the historical decline in population mortality rates
- Effective medicine is a fairly recent phenomenon (twentieth century)
- Other causes of mortality declines
  - public health measures
  - spread of knowledge of the sources of disease
  - improvements in environment (supply of foodstuffs – agricultural and industrial revolutions)

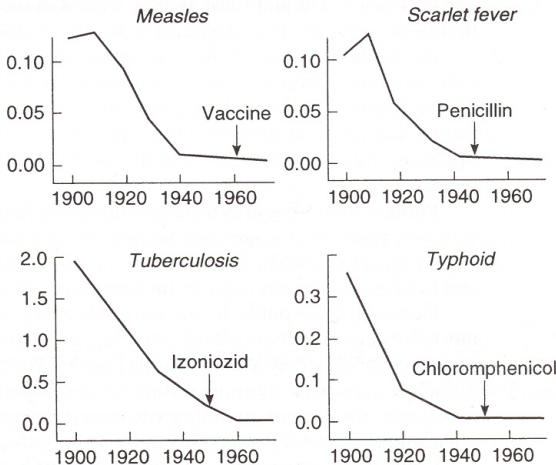
# Historical death rates per million in England and Wales

	<i>1848–1854</i>	<i>1901</i>	<i>1971</i>	<i>Percentage of Reduction (1848–1854 to 1971) Attributable to Each Category</i>	<i>For Each Category, Percentage of Reduction (1848–1854 to 1971) That Occurred Before 1901</i>
I. Conditions attributable to microorganisms:					
1. Airborne diseases	7,259	5,122	619	39	32
2. Water- and foodborne diseases	3,562	1,931	35	21	46
3. Other Conditions	2,144	1,415	60	12	35
Total	12,965	8,468	714	72	37
II. Conditions not attributable to microorganisms	8,891	8,490	4,070	28	8
All diseases	21,856	16,958	5,384	100	29

\*Standardized to the age/sex distribution of the 1901 population.

Source: Reprinted from McKeown, Thomas, *The Modern Rise of Population*. New York: Academic Press. 197A (p. 54).

# US Death rates: infectious diseases



Reprinted from *Millbank Memorial Fund Quarterly/Health and Society*, John B. McKinlay and Sonja M. McKinlay, "The Questionable Contribution of Medical Measures to the Decline of Mortality in the United States in the Twentieth Century," *Millbank Memorial Fund Quarterly/Health and Society* 55 (1977): 405–428, with the permission of Blackwell Publishers.

- Evidence that public health measures have contributed to the decline in mortality rates, however,
- Disputes whether public health was the major contributor
  - ... it primarily affected the exposure to waterborne and foodborne disease
  - ... it cannot account for the large decline in airborne infectious disease mortality
- Public health measures
  - immunizations
  - quarantines
  - standards for sanitary water supplies and sewage systems
  - sanitary handling and treatment of foodstuff

These measures came into widespread use late in the era of mortality declines



- The introduction of corn and potatoes
- Agricultural advances
  - new crops
  - crop rotation
  - seed production
  - winter feeding
  - improvements in farm implements
- Improved nutrition has obviously reduced infectious diseases
- Fogel (1986)
  - 40 % of the historical decline in mortality rates due to improved nutrition
  - the biggest rewards attributable to infants
  - the quality of the protein in the diet played a major role

# What do we learn from the medical historian?

- Controversy over the importance of different measures (public health, nutrition, environment, ...)
- **Consensus on the minor role of medical practice**
- Nevertheless, medical research is important as it not only contributes through improvements in medical practice but also through its influence on health-enhancing practices (insights into causes and transmission of diseases ...)
- Mushkin (1979) estimates that medical research accounted for almost one third of the cost-savings to society from reduction in sickness or death rates in the US between 1900 and 1975

# What do we learn from the medical historian?

- Murphy & Topel (2005) estimate a huge economic contribution from medical research: increased longevity added \$ 3.2 trillion to national health in the US between 1970 and 2000
- Bunker & Frazer & Mosteller (1994) sum up that health care offers *an estimated gain in life expectancy of about 5 years and a potential for adding one and half or two more years . . .*
- They demonstrate that health care is often effective in treating depression, pain and discomfort – and the gains to quality of life and well-being are probably substantial
- Pain from migraine headaches, terminal cancer, heart treatment, and many more cases can be effectively reduced or even eliminated.

The contribution of health care **in total** has been substantial in recent decades.

# Health production in modern times

- Econometric tools are applied to estimate marginal products of health care
- Elasticities of health with respect to expenditure on health care inputs (several studies – based on mortality)

<i>Study Cited</i>	<i>Date of Study</i>	<i>Health Care Elasticity*</i>	<i>Significant?</i>
Hadley	1982	0.12 to 0.17	Yes
Hadley	1988	0.20 to 1.00	Yes
Sickles and Yazbeck	1998	0.03 to 0.05	Yes

\*This is the elasticity of health with respect to health care expenditure.

- The marginal product of health care in the US is small
- The most important factors influencing mortality are related to socioeconomic status and lifestyle (Thornton 2002)

# Health production in modern times

- Nevertheless, the contribution of investment in health care technology over the past several decades is estimated to be in the trillions of dollars.
- Much of the improvement in life expectancy in this period can be attributed to health care improvements
- Evidence that life gains are worth extra costs of medical care (Murphy & Topel 2005; Cutler 2004)
- In many instances exceed incremental benefits incremental cost

## The Rand Health Insurance Experiment

- One of the largest randomly controlled economic experiments ever conducted
- Effects of alternative health insurance policies were tested on the demand for health care and on the health status
- The greater the portion of their health care bill the less health care individuals choose to purchase
- Fully insured people purchased 40 % more health care as compared to those who had to pay their own bill
- However, this increase in services had almost no effect on health status for the average adult

# The Rand experiment

<i>Standard 95% Error of Confidence Plan</i>	<i>Mean</i>	<i>Mean</i>	<i>Interval</i>	<i>Number of Persons</i>
Free	5.47	0.42	4.65–6.29	1,136
Intermediate (25%, 50%)	4.82	0.37	4.09–5.55	983
Individual Deductible	4.54	0.36	3.83–5.25	787
Family Deductible (95%)	4.82	0.53	3.78–5.86	600

*Source:* Reprinted by permission of the publisher from *Free for All? Lessons from the RAND Health Insurance Experiment* by Joseph P. Newhouse, Cambridge, MA: Harvard University Press, 1993. Copyright © 1993 by the RAND Corporation.

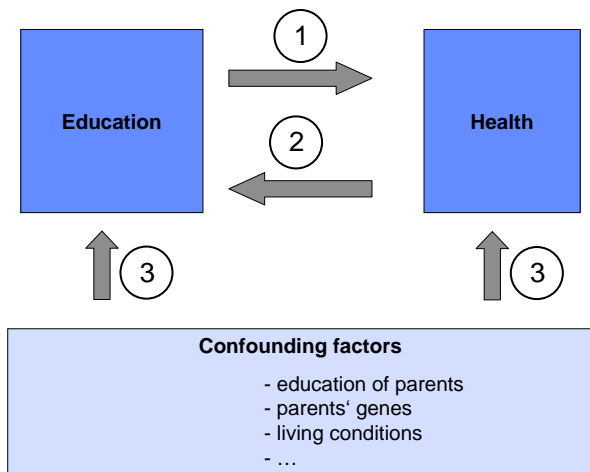
- Empirical evidence on the influence of lifestyle on health
- “... *what we do for ourselves often matters the most for our health* ...”
- Smoking certainly causes ill health
- Maternal cigarette smoking has a significant negative effect on newborn birth weight (Rosenzweig & Schultz 1983; Rosenzweig & Wolpin 1995)
- It is well-known that environmental pollution causes ill health and deaths in individuals (e.g. Cropper et al. 1997)



# The role of schooling

- Health status is significantly correlated with schooling
- Two different theories on the role of schooling
  - better educated persons are economically more efficient producers of health (they have the know-how to stay healthy; they better know how to use medical and other market inputs and their own time to produce health)
  - schooling and health are correlated only because they are both related to one or more other factors: **self-selection problem**
  - People with low discount rates will tend to invest in both education and health

# The causality issue



- A natural experiment setting (Lleras-Muney 2002)
- Compulsory education laws came into being in various places at various times in the US in the 20th century
- Birth cohorts from that era would have experienced different levels of education but would have been similar in many other respects
- The survival pattern of these people allowed to detect a pure influence of education on health
- Conclusion: education has a clear, **causal**, and positive effect on health