The Production of Health

Sources: David Cutler unpublished manuscript (Aug 2002), Folland text, Harvey Fineberg presentation (Aug 2003)

Questions to address

1. How has mortality changed?
   - (Mortality has declined a lot)
2. Why has mortality declined?
   - (A mix of factors, formerly nutrition and public health; increasingly medical interventions).
3. And, how does this help us better understand a production function for health?

Life Expectancy at Birth

Cumulative mortality decline of about 75% - decline particularly large for infants and the elderly

- Mortality has declined over the 20th century – in three stages - as a result of 1) public health and nutritional improvements, 3) the development of antibiotics, and 4) medical technology to treat cardiovascular disease.

Doctors in 1900 were so poorly trained that they often did not know what to do.

In 1894, there were riots in Milwaukee when an ambulance came to take to the hospital a child suspected of having smallpox to the hospital. It seems the child had already lost a sibling in the institution and his mother did not want to lose another. Facing 3,000 people armed with clubs, the ambulance attendants back away.

Increasing life expectancy

- Today, life expectancy is close to 80.
- The typical baby born in 1900 could expect to live to about age 45.
- "1900" is not the year when mortality rates started to decline. Data from the UK and France show life expectancy beginning to decline a century earlier.
- Prior to then, life expectancy at birth was only in the mid-30s.

In the late 1800s a leading French physician lamented: “Is it not humiliating for our country and for our generation that, in spite of public and individual hygiene, the mortality among the newly born is such that one can say, without fear of contradiction, that an infant just born has less chance than a man of ninety of living a week…?”

The overall trend towards longer life masks an important source of heterogeneity.

- From 1800 until about 1940, reduced mortality was almost entirely the product of reduced infant and child mortality.
- In 1900, one in five infants died before age 10. Life expectancy for those who survived to age 10 was about 60.
- By 1940, well over 90 percent of infants survived to age 10.
- Since 1940, mortality reductions have shifted to older ages.

In "Who Shall Live," Victor Fuchs concludes:

- [Explaining the decline in infant mortality through 1940]…"It is important to realize that medical care played almost no role in the this decline. While we do not know the precise causes, it is believed that rising living standards, the spread of literary and education, and a substantial fall in the birth rate all played a part."

Apply this to Folland Figure 4-3 (p. 79)

- Infant and child mortality was so high because infectious disease was rampant. Infectious diseases killed people at all ages, but particularly the young. Young people had not yet developed disease antibodies, and their poor nutrition made them susceptible to infection.
- Over time, public health improvements that reduced disease exposure, including clean water, sewers, and pasteurized milk, coupled with increased nutritional intake from improved agricultural output reduced the infectious disease burden.

Mortality decline during the 20th century

- Between 1940 and 1960, there was a subtle but important shift in the nature of mortality reduction. Infectious disease mortality continued to decline, but medical care began to play a larger role, with the development of [antibioticics] sulfa drugs in the 1930s and penicillin in the 1940s.
- Later in the century: new medical technology for treating cardiovascular disease.

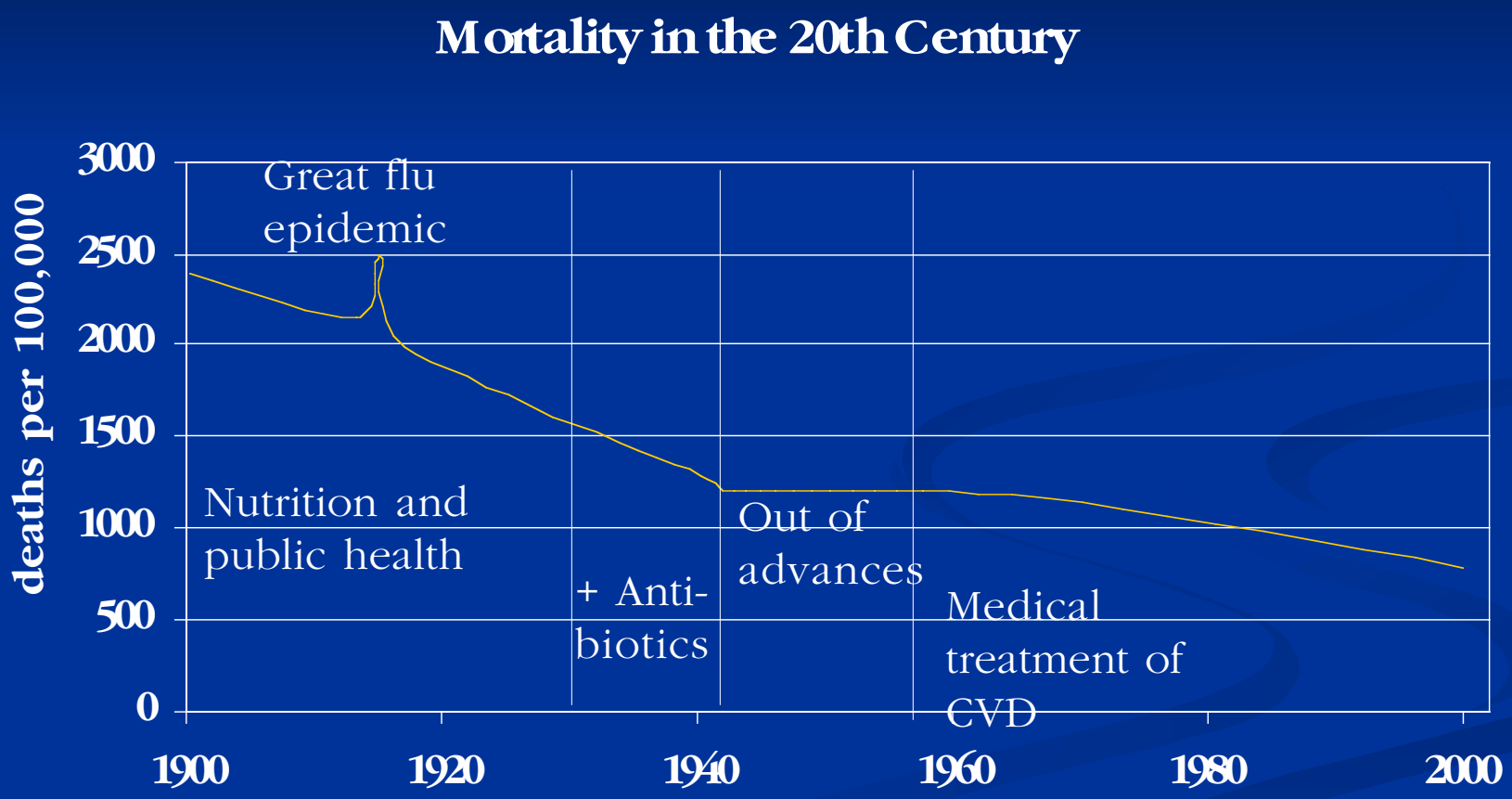
Had we reached our limits of medical progress?

By 1960, infectious disease mortality had been substantially eliminated. Death in infancy was rare, and more people made it to middle and older ages. Observers viewing these trends were impressed. But they were also grim in their outlook for the future. With infectious disease largely conquered, the leading killers were cardiovascular disease, cancer, and other chronic conditions of old age.

Fundamental shift in health improvments: "medicalization" of health care

- In the late 1960s, mortality rates once again started to fall, a trend that continues today.
- Between 1960 and 2000, cardiovascular disease mortality, which largely strikes later in life, declined as rapidly as infant and child mortality did earlier in the century. AND…
- **Where declining infant mortality was once associated with reduced infectious disease, today it has much more to do with survival of low birth weight infants. Premature infants used to die routinely; now they frequently survive.**

Eras of Health Improvement



Contribution of health care to population health: the modern era

(Folland Table 4.3)

- Econometric models estimate the *elasticity of health with respect to health care expenditure.*
- Findings: marginal effects small but statistically significant.
- Elasticities roughly (+ 0.10). Interpretation?
- With this estimate, a 10% increase in health spending adds 1% to health (~ 0.8 years, if health is defined as avg life expectancy.
- Exercise – Which factors in Table 4-4 were important in explaining improvements in black neonate mortality rates? White rates?

Can you relate this to a production function diagram?

Think TP & MP (with health status on the Y-axis and health care inputs on the X-axis)

Contribution of lifestyle and environment to population health

- Fuch's comparison of Nevada and Utah – neighboring states with similar levels of income and medical care
- For every age group, Fuchs finds excess death rates in Nevada: 20-39 cohort – 44% higher for males, 42% higher for females

Contribution of lifestyle and environment to population health

- Maternal behavior and newborn health – maternal smoking and/or drug use harms newborns
- Philadelphia pollution study – reducing pollution level by 100 micrograms per cubic meter would reduce death by 6%+ for the general population and 10% for the elderly.
- Schooling – yes. Why? a) more efficient producer (consumer) of health; b) low discount rates – health and education viewed as investments.

Discussion Question

- Why do higher income people live much longer than low income people?
- Consider life expectancy at age 65 for white men:
  - 14.0 additional years for income <$10,000
  - 17.4 additional years for income $25,000+