L1: Overview of class

Marcelo Coca Perraillon

University of Colorado
Anschutz Medical Campus

Health Economics
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Updated lectures are here: `https://clas.ucdenver.edu/marcelo-perraillon/teaching/health-economics-hsmp-6604`

Outline

- Economics and health economics
- The evolution of mortality over time
  1. Health improvement over time and population growth
  2. Health and income (and education) correlate
  3. Mortality causes have changed
  4. Advances in medical treatments are remarkable
- Health care is expensive, but why is it a problem to spend so much in health care?
- To math or not to math?
- Topics we will cover
- Tips on learning and studying
- Class logistics

The very basics

- This class is about health economics and health policy
- Economics is a discipline that (mostly) deals with the production and consumption of goods and services, although economists at times work on all sorts of problems (for good and bad)
- Economics emphasizes that **resources are scarce**
- How do we allocate resources in efficient ways? Should a central planner do it? Should we let the unregulated market do it? How do markets function and what are the conditions needed for markets to function? What happens when a market does not work?
- The sample questions above are **positive** (a description of how the world is) or **normative** (a prescription of what should happen; policy recommendations)

Health care

- **Health economics** is a branch of economics that deals with the supply and demand of health care and health
- Note that I wrote "**health care**" and "**health**." This distinction is going to become clearer during the semester
- We do not buy or sell "health," but we care about our health
- We do buy health care (vaccines, dental cleanings, hospitalizations) and can do things that make us healthier (eating well, running, yoga, sleeping enough)
- Note that doing things requires **time**. Time is a scarce resource
- We buy things from **providers** (hospitals, doctors, nursing homes)
- Most of us have intermediaries in **insurance companies**
- Much of our interactions in any market are **regulated by the government** by means of laws and regulations, including this class

Some good news first

- We all need some good news lately so I'll start with some amazingly good news: life expectancy at birth has never been so high. You probably have a long life ahead

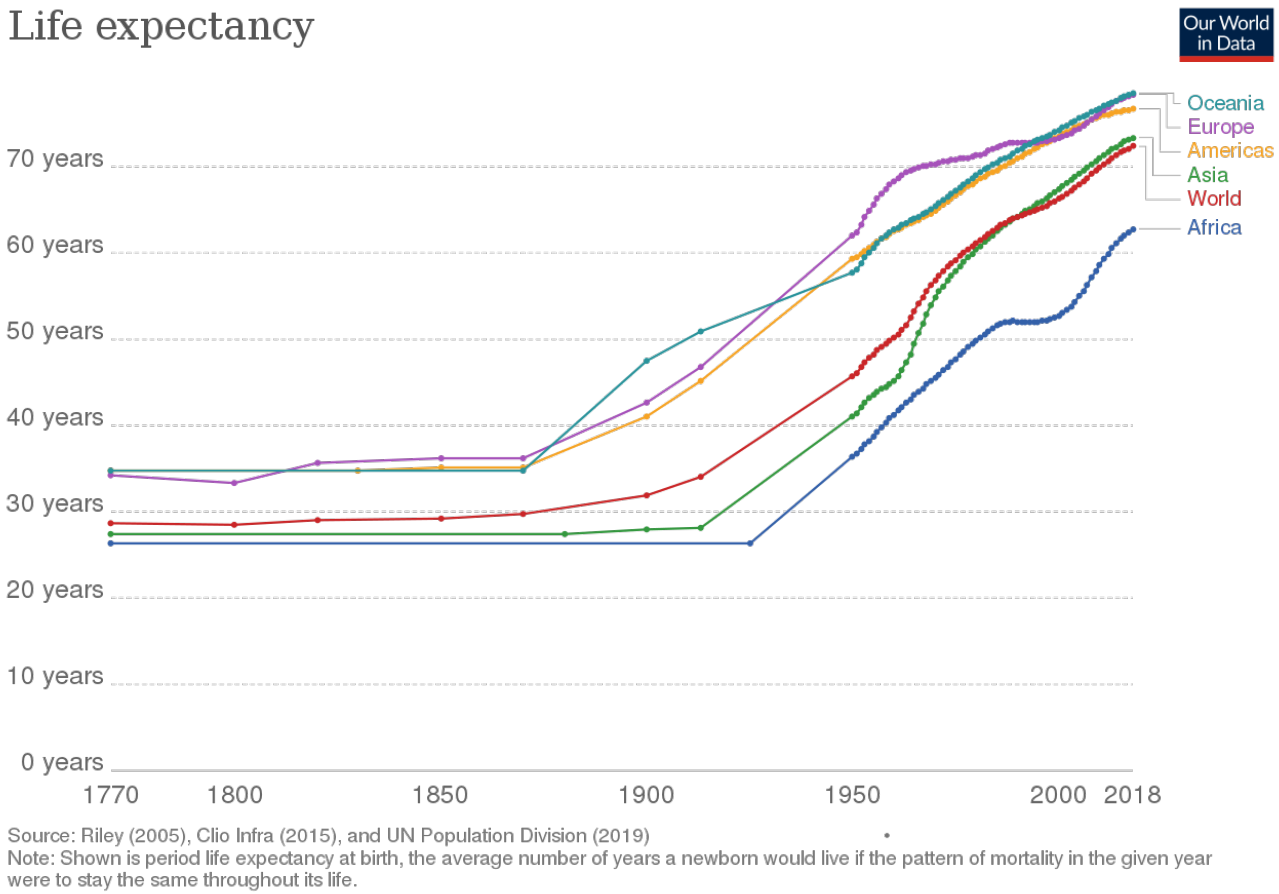


Figure: Source: Wikipedia, life expectancy

Life expectancy

- Best estimate is that in hunter-gatherer societies life expectancy was about 25-33 years. 20-30 in classic Rome
- It's not that nobody lived long; we are talking about life expectancy at birth
- Not a lot of progress until modern times in more developed countries (see graph)
- **Life expectancy is an estimate of the average years of life a person is expected to live**
- Life expectancy is calculated using life tables
- The increase in life expectancy has resulted in a large (exponential) increase in population

Population growth

- However, the rate of population growth has been decreasing

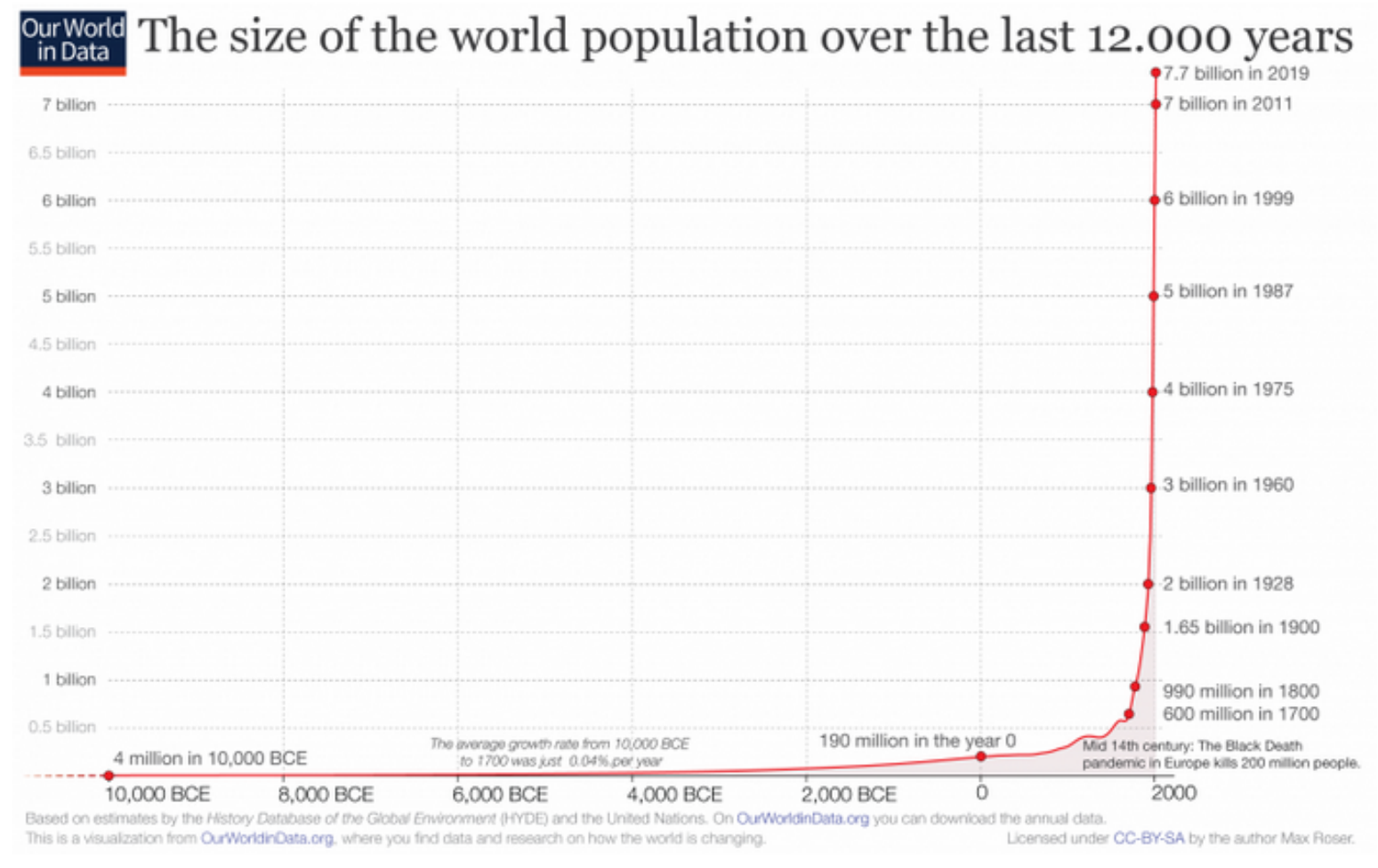


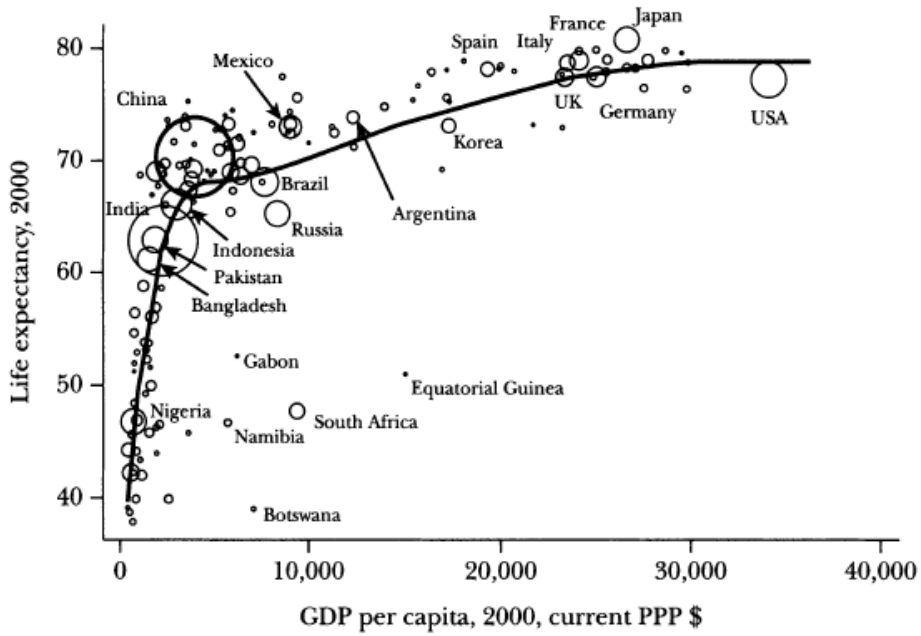
Figure: `https://ourworldindata.org/world-population-growth`

Life expectancy depends on income (and education)

- The Preston curve (after demographer Samuel Preston) describes the relationship between Gross Domestic Product (GDP) and life expectancy
- The money we spend is income for somebody else, so GDP is also income

Figure 1

The Preston Curve: Life Expectancy versus GDP Per Capita



Source: Reproduced from Deaton (2003, Figure 1).
Note: Circles are proportional to population.

Figure: Source: Cutler, Deaton, Lleras-Muney (2006)

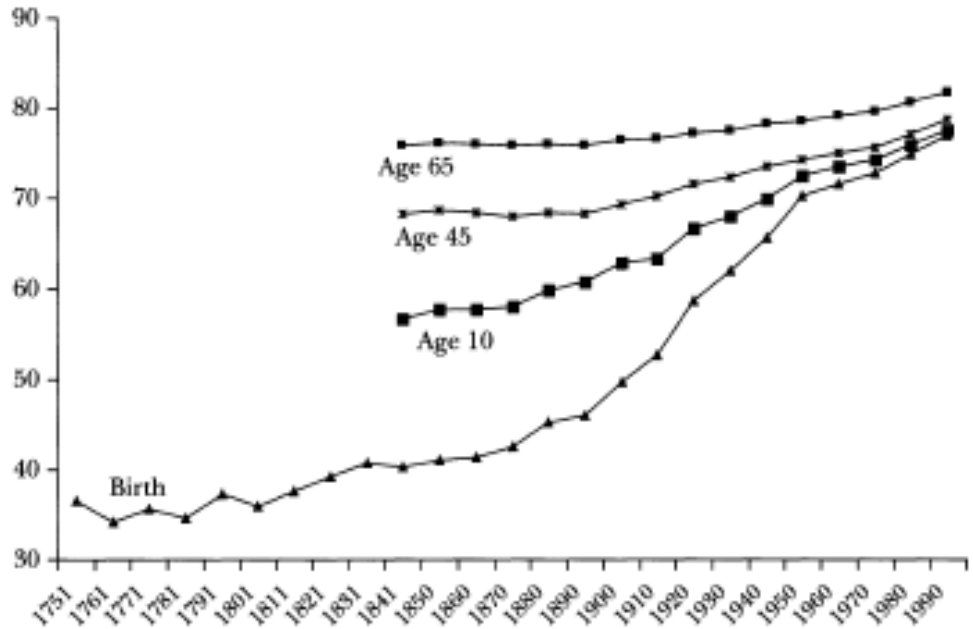
Why the increase in life expectancy?

- First, note from the graphs that life expectancy started increasing by 1850
- The increase in life expectancy was not uniform; it was was larger at younger ages
- Reducing infant mortality was one of the most important factors
- Infants are particularly prone to infections
- From Cutler, Deaton, and Lleras-Muney (2006):
- "In 1848, 60 percent of deaths in England were from infectious disease. Between then and 1971, infectious disease mortality declined by 95 percent."

Life expectancy by age

- Life expectancy increase was mostly due to reductions in mortality at younger ages

Figure 2
Expected Age at Death, England and Wales



Source: Data for 1751–1841 are from Wrigley and Schofield (1981, Table 7.15, p. 230); data from 1841 are from the Human Mortality Database.

Figure: Source: Cutler, Deaton, Lleras-Muney (2006)

What explains the increase in life expectancy?

- Another source of improvement health outcomes was **better nutrition**
- Nutrition has large effects starting in conception
- Humans are a lot taller now than before. Well nourished people are better at fighting infections
- Robert Fogel, an economist who taught at U of Chicago for many years, showed that caloric intake increases resulted in better health and an increase in height
- Of course, improvements in **public health** also explain the increase in life expectancy
- Things like filtering and chlorinating water supplies, sanitation systems, pasteurization, vaccines, boiling water, and so on

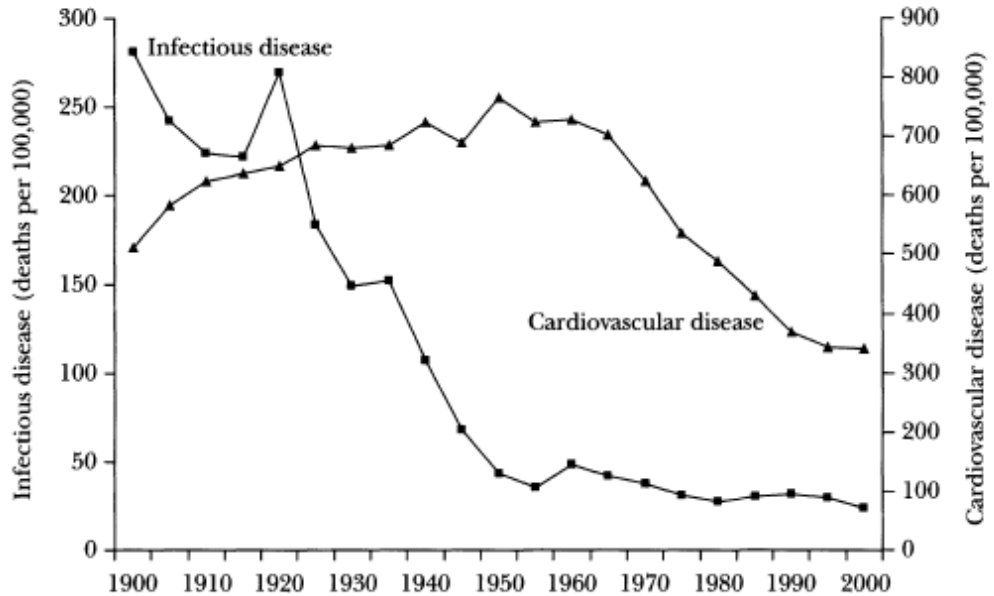
Medical treatments

- But the most important factor has been the amazing, almost miraculous, improvement in **medical treatments** that either **cure** or **control** disease. This improvement in treatments *is a fairly new development*
- Think about now-mundane treatments and knowledge:
  1. Anesthesia? 1846. First coronary artery bypass surgery? 1960
  2. Antibiotics? Penicillin discovered by Alexander Fleming in 1928
  3. Thyroid hormones? Extracted from guinea pigs around 1929. First synthetic pill available in 1955
  4. Neonatal intensive care units? Around 1950. Even babies weighting less than 1,000 grams can survive today – that's 2.2 lbs. Your textbook weights 2.6 lbs
  5. Realizing that smoking is really bad for health? Around 1950 (most people stopped many years later; varies by education)
  6. Ventilators? Usable around 1950
  7. Polio vaccine? 1950
  8. Dialysis? 1940s
  9. First use of insulin? 1922
  10. Chemo? 1940s
- Think about a chronic disease you have or an acute disease you had. Google when the best treatment was invented. That's **technological progress**

Life expectancy by age

- The post war period marks the birth of modern medicine. Note the reduction in cardiovascular disease

Figure 3
Mortality From Infectious Disease and Cardiovascular Disease, United States, 1900–2000



Source: Data are from the Centers for Disease Control and Prevention, National Center for Health Statistics, and are age adjusted.

Figure: Source: Cutler, Deaton, Lleras-Muney (2006)

Income (and education) matters

- Note the different structure of mortality

Table 1

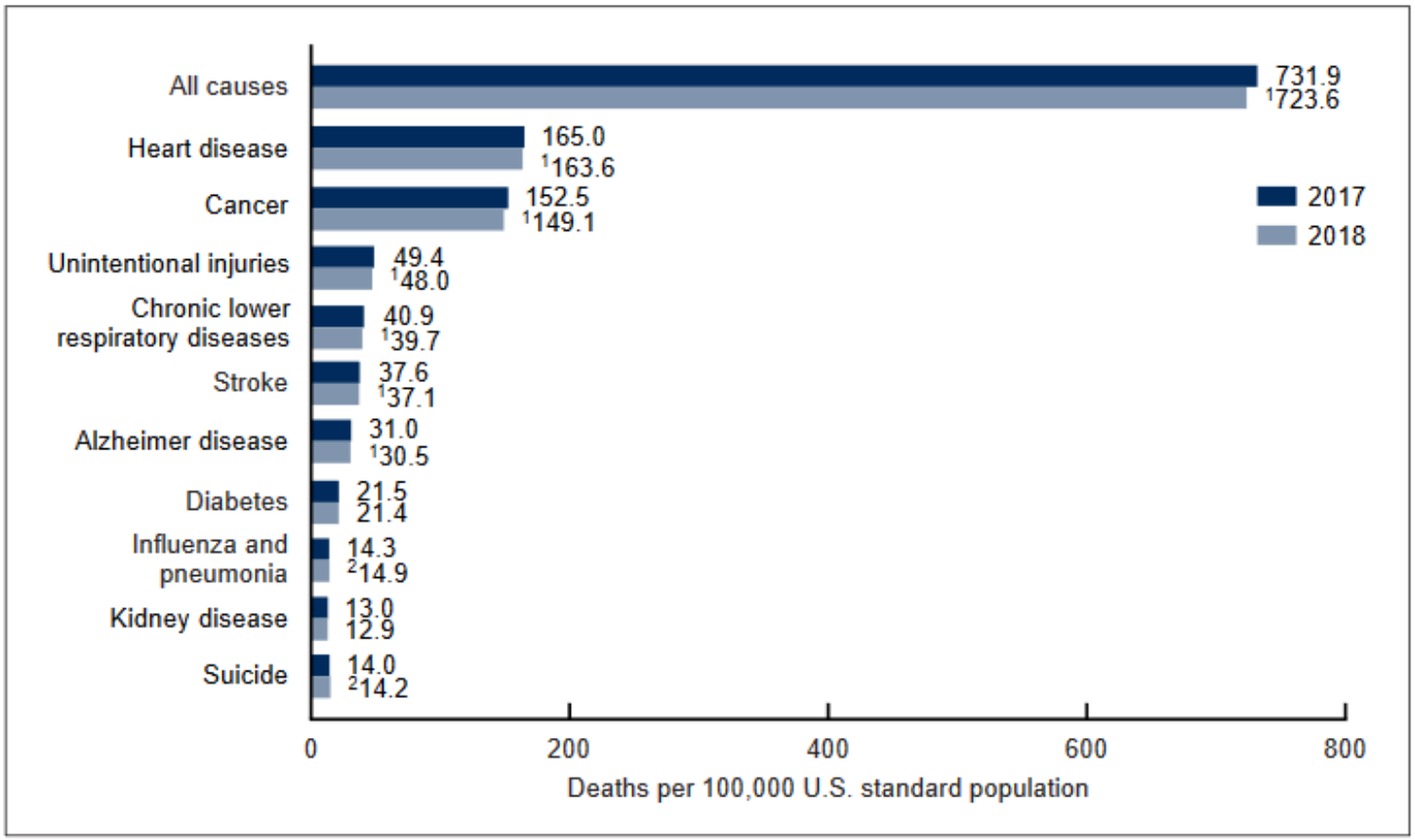
The Worldwide Structure of Mortality in 2002

	Treatments/Prevention	*World*	*Low-income countries*	*High-income countries*
Deaths per 100,000		916	1,113	846
Percent of total deaths by age				
Children (0–4)		18.4%	30.2%	0.9%
Elderly (60+)		50.8	34.2	75.7
Percentage of deaths from chronic diseases				
Cancer	Partially preventable and treatable	12.4	6.3	26.2
Cardiovascular disease	Partially preventable and treatable	29.3	21.5	38.1
Numbers of deaths, millions				
Respiratory infections*	Antibiotics	3.96	2.90	0.34
HIV/AIDS	Anti-retroviral therapy	2.78	2.14	0.02
Perinatal deaths*	Pre- and post-natal care	2.46	1.83	0.03
Diarrheal diseases*	Oral rehydration therapy	1.80	1.54	—
Tuberculosis	Preventable with public health; usually treatable	1.57	1.09	0.01
Malaria*	Partially preventable; treatable	1.27	1.24	—
DPT/Polio/Measles*	Vaccinations	1.12	1.07	—

Figure: Source: Cutler, Deaton, Lleras-Muney (2006)

Current top causes of death

Figure 2. Age-adjusted death rates for all causes and the 10 leading causes of death in 2018: United States, 2017 and 2018



[1]Statistically significant decrease in age-adjusted death rate from 2017 to 2018 ($p < 0.05$).
[2]Statistically significant increase in age-adjusted death rate from 2017 to 2018 ($p < 0.05$).
NOTES: A total of 2,839,205 resident deaths were registered in the United States in 2018. The 10 leading causes of death accounted for 73.8% of all deaths in the United States in 2018. Causes of death are ranked according to number of deaths. Rankings for 2018 were the same as in 2017. Data table for Figure 2 includes the number of deaths for leading causes. Access data table for Figure 2 at: https://www.cdc.gov/nchs/data/databriefs/db355_tables-508.pdf#2.
SOURCE: NCHS, National Vital Statistics System, Mortality.

Figure: `https://www.cdc.gov/nchs/data/databriefs/db355-h.pdf`

How much would you pay to be alive in 2021 instead of 1921 or 1940?

- Wouldn't you be **willing to pay** a large amount to have access to current medical treatments?
- Would you accept $8,000 in exchange for receiving care using the same *treatments* and *knowledge* than in 1950?

- The above are a (sort of) *stated preferences* question; towards the end of the class we will talk about **stated** and **revealed** preferences
- Revealed preferences methods are used to price life (the **value of a statistical life**): using wages of risky occupations, how do people value life based on their actual choices?
- No, it's not infinity. We say that life is precious and priceless, but our behavior is inconsistent with that notion. We face constraints and opportunity costs
- For your first homework, you'll read Cutler (2018) who poses (and answers), this question: "What Is the US Health Spending Problem?"

"Bad news" (?) graph

- Hard to avoid showing a graph like this in an introductory health econ class. So here it goes: health care is expensive and now is a large fraction of the economy (As P. Krugman says, the "US is a large insurance company with an army")

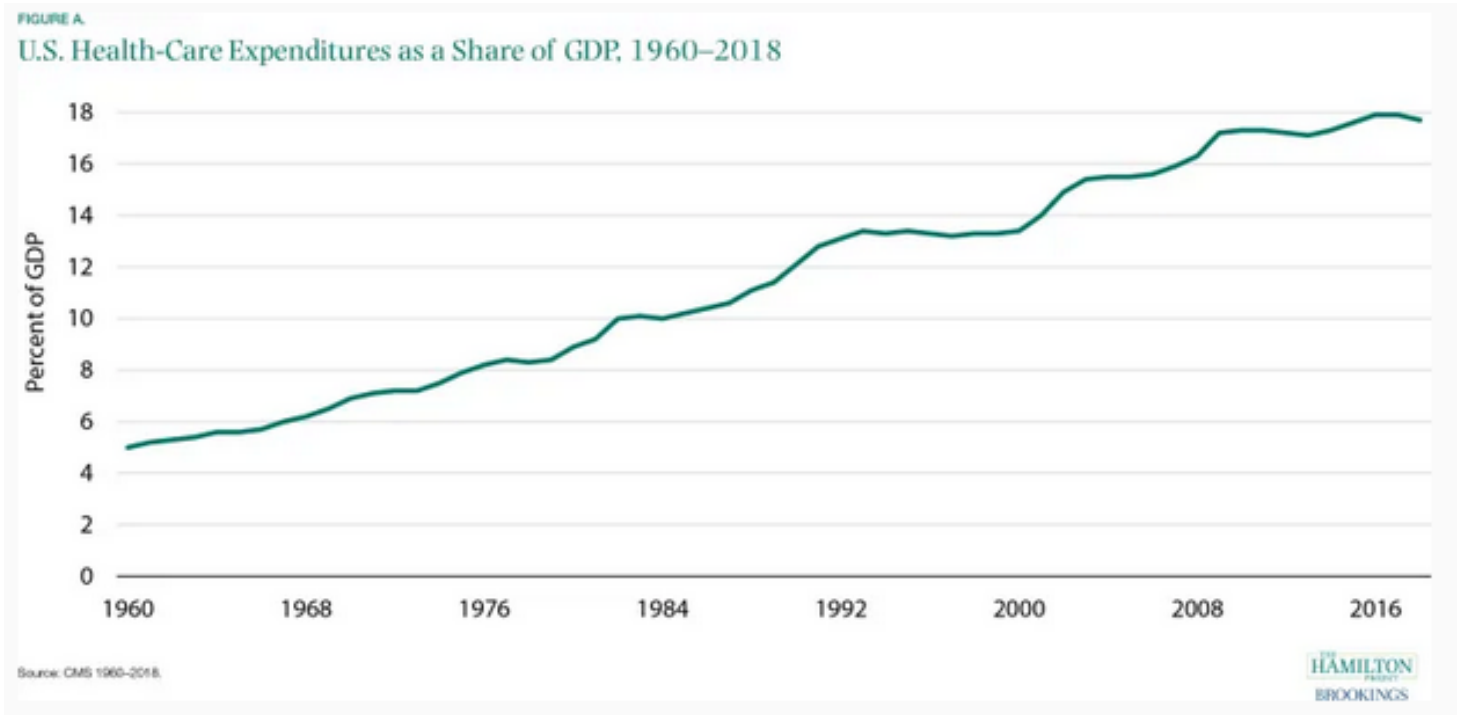


Figure: `https://www.brookings.edu/research/a-dozen-facts-about-the-economics-of-the-u-s-health-care-system/`

Overview of class

- Our brief tour of health and its relation to income (and education) sets up the issues we will cover
- First, we need to review the basics of economics and **perfectly competitive markets** (the unicorn)
- We will start with **consumer theory** as it results in **demand curves**
- We assume that consumers behave as if they were maximizing their happiness/satisfaction (utility) subject to budget constraints – nobody has an infinite budget
- We will review **producer theory**. We assume that producers **maximize profits** subject to cost constraints. This results in **supply curves**
- The combination of supply and demand results in **equilibrium prices and quantities** – and we have a market

The health care market

- The conditions for perfectly competitive markets (this is the "invisible hand" and Adam Smith), and what I (somewhat) affectionately call the unicorn, are seldom present in health care markets
- The origin of health economics is the realization that the market for health care is very different than other markets
- Much of the difference is due to **uncertainty** and **asymmetric** information, but there are many other reasons. We will go over each of them
- Health economics follows the organization of economics: we will study the **demand and supply of health care** (and, in a sense, health)

Demand for health care

- Do people demand health care as if health care were a product like cars or food? Is health care a different type of product?
- We will discuss evidence showing that health care demand actually "**slopes downwards**," which is lexicon for saying that health care is like most other goods: price goes goes up, quantity demanded goes down
- The above is akin to the law of gravity in physics –with few exceptions
- We will go over one of the most important mathematical models to understand the demand for health care: the human capital model aka the Grossman model. It will give us a *framework* for understanding health disparities (usually called *health inequality* in economics)
- We also need to understand the **demand for health insurance**, which exists because of uncertainty

Supply of health care

- The supply of health care is driven by hospitals, physicians, nursing homes... We usually call them "providers"
- Here the market is different than the unicorn, too. One big difference is **regulations**, not just government intervention
- You can't just don a white coat and practice medicine. If you get caught, you go to jail
- You can convert your house into an Airbnb but you can't convert your house into a hospital or nursing home
- Hospitals cannot even decide by themselves how many beds they can have
- We will discuss important supply side issues that are deviations from perfectly competitive markets

Policy, policy, policy and more policy

- Once we go over basic theory and have a good *analytic framework*, we will go over how the health care market is organized or should be organized
- I'll cover in detail the Affordable Care Act (ACA), which was actually very carefully reasoned
- The ACA became a symbol of "socialism," "big government" intruding into your sacred life... Yet, the ACA was an attempt to *create a market* where the market wasn't working for itself. There is a lot if irony here
- Politics has an amazing way of turning things upside down; distorts reality like a kaleidoscope
- Towards the end of the class, we will circle back to today's class: **Is the large increase in health care costs worth it?**

To math or not to math?

- **Modern economics is also a branch of applied math**, for good and bad
- The good part is that math makes assumptions clear, you cross the t's and dot the i's. Little room for murky thought
- Believe it or not, math also makes some issues **easier to understand**, not harder
- The problem is that **math is a language**, like Spanish or Japanese. Piece of cake if you know the language, a bunch of symbols and strange sounds if you don't
- I have several audiences in this class: PhD students who (should) know calculus and MPH students who I assume don't know calculus or advanced math. So I'll use different ways of explaining concepts: math, words, graphs, more words...

Logistics: class notes and textbook

- I like you to have good lecture notes. It's your guide to the core, important concepts
- It's also because of my own personal style and bias: I'm not very good at paying attention in classes; I tend to daydream to a professional degree. I do better reading than listening
- The notes will complement the textbook. I like the textbook, although in some sections it might be a bit too advanced or I just don't like the presentation
- For homework and exams, I will assume you have read the textbook and assigned readings. **You are graduate students**
- The most valuable skill you learn in graduate school is **how to learn**. You learn by sitting down and studying. Don't understand something? Read it again. And then again. Still not? Try one more time. Then talk to your friends. Email the TA (Mika Hamer). Email me... Then read it again and again
- (Google "grit and learning")

Homework

- I don't view homework as an opportunity to grade your performance, although we do need to grade your performance
- The goal of weekly homework is for you to absorb the material and learn
- You won't learn everything you need to know in graduate school; but, again, hopefully **you will learn how to learn**
- Listening to me talking is not learning. You need to sit down and study for many hours. I don't know of any other way to learn other that **time and effort**
- **Groups**: Do form a group since you can learn a lot by discussing homework questions among your classmates
- **Syllabus**

Questions?

- Please ask questions in class... I know, Zoom is not the best, but when life gives you Zoom, blah blah blah