Lecture 6: Health

EC2303: Intermediate Development Economics

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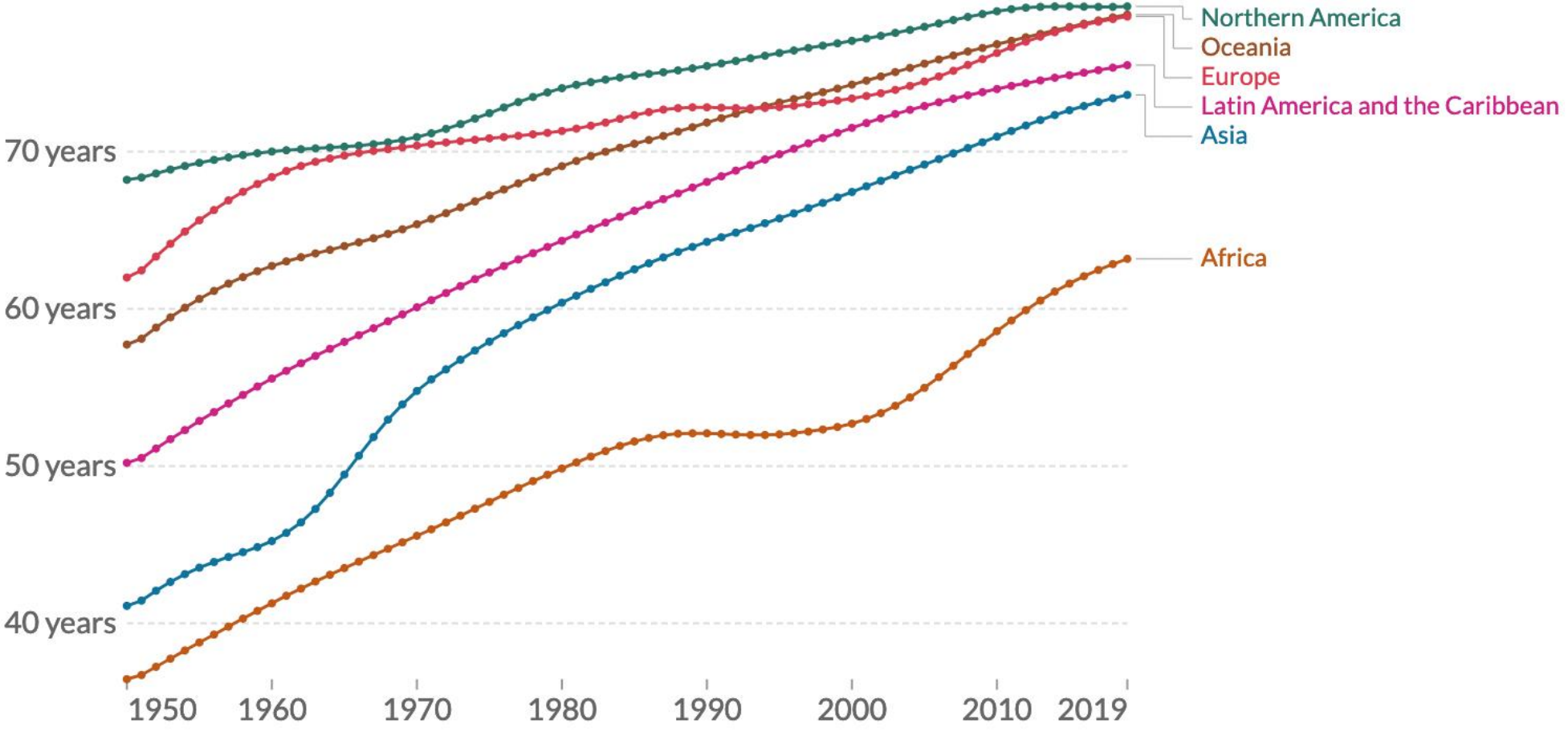
Context for this lecture

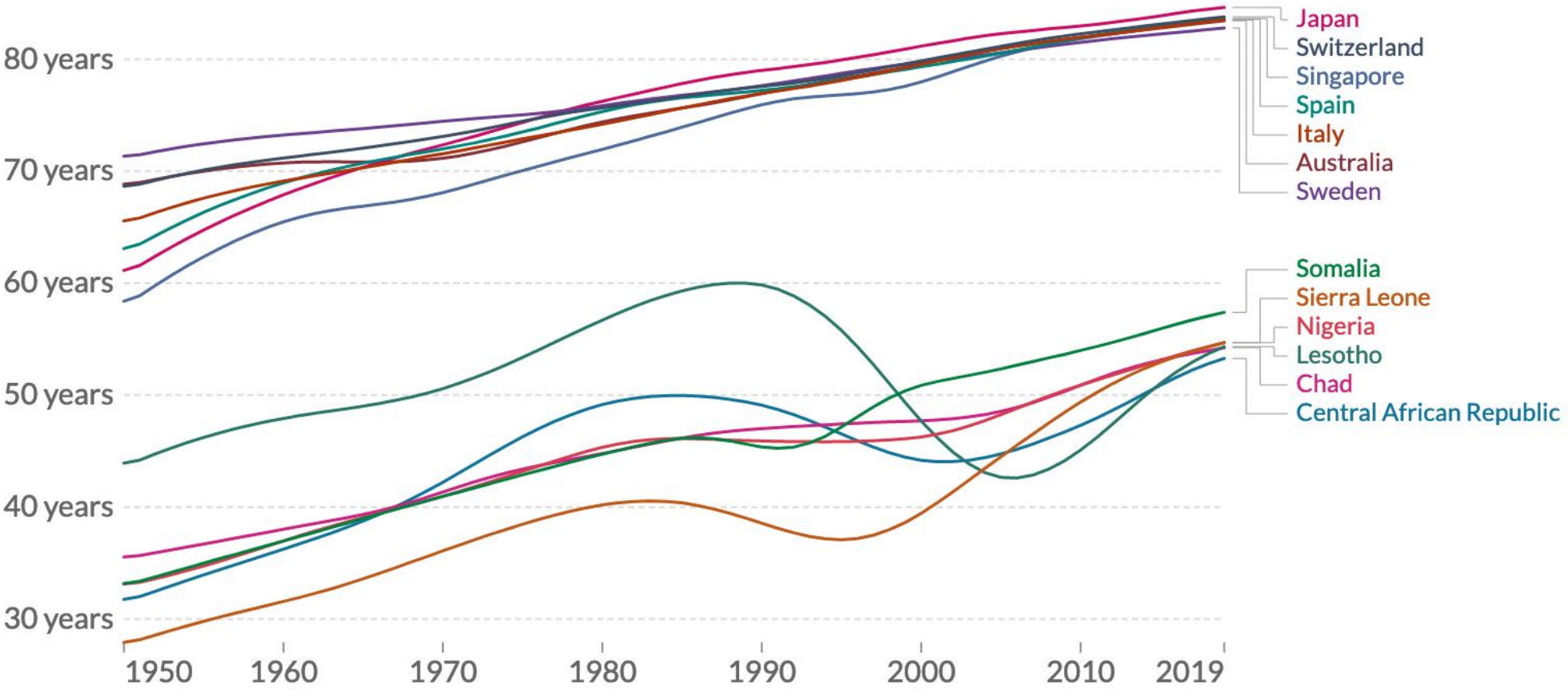
- Last week, we discussed one possible source of a poverty trap: suboptimal nutrition. We saw that there is likely a "feedback loop": people with low incomes often don't have enough food, which makes them less productive, which in turn reinforces their poverty. However, we also saw that this likely isn't a poverty trap in the strict, technical sense.
- Today we'll consider another possible source of a poverty trap: health. Poor people often have bad health, which can make it difficult to study and work, resulting in low incomes and a perpetuation of poverty.
- We'll see that increases in income often don't lead to improved health. This suggests that liquidity/credit constraints are not the only obstacle to improved health.
- We'll then discuss two kinds of possible obstacles to improved health outcomes:
  - On the supply side, health service delivery might not be very good.
  - On the demand side, lack of information, present bias, and forgetting/inattention may make it hard to take up health behaviors.

Life Expectancy 1950–2019 (from Our World in Data)



Source: Riley (2005), Clio Infra (2015), and UN Population Division (2019)
OurWorldInData.org/life-expectancy • CC BY
Note: Shown is period life expectancy at birth, the average number of years a newborn would live if the pattern of mortality in the given year were to stay the same throughout its life.

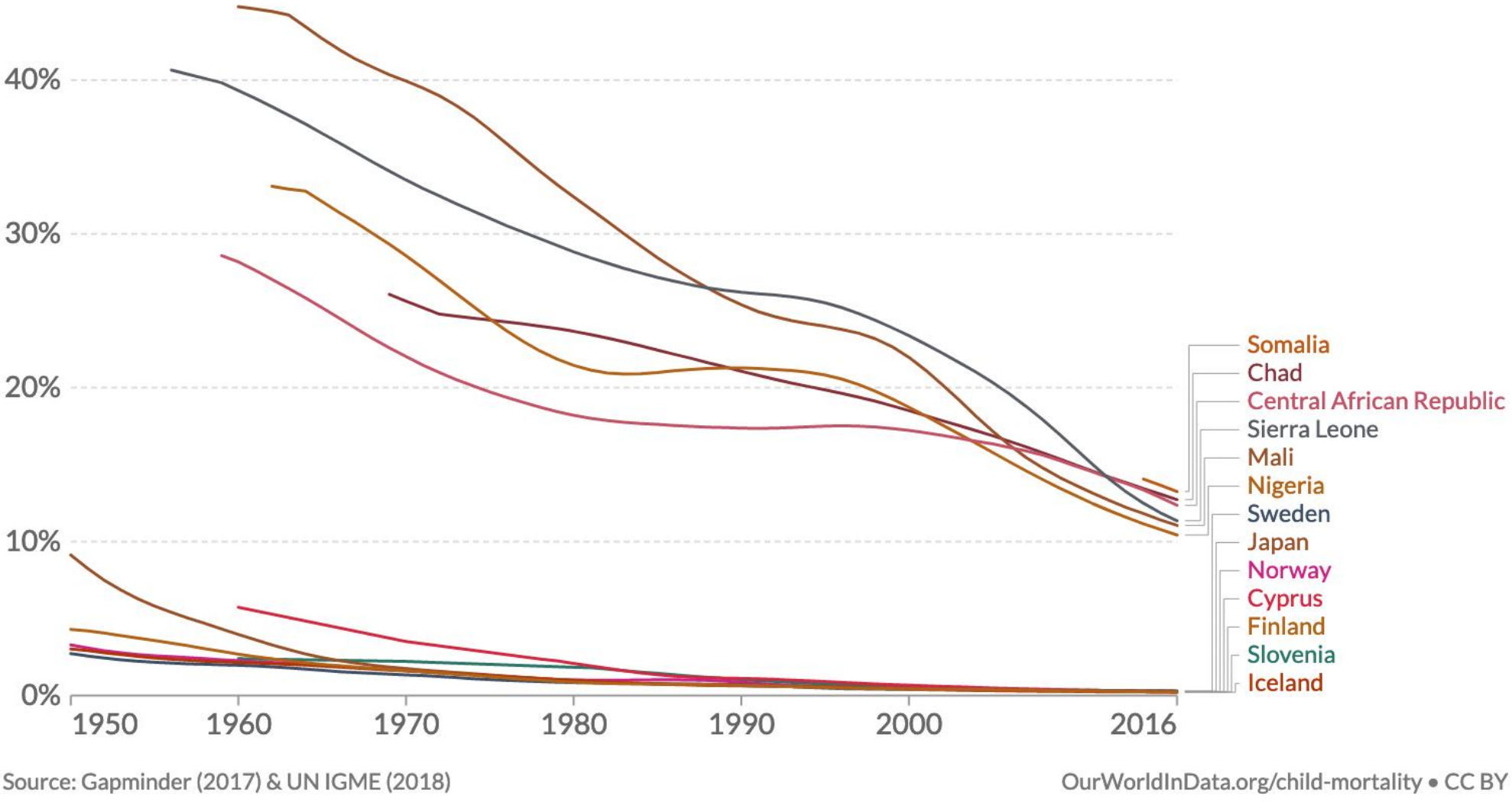
Life Expectancy 1950–2019 (from Our World in Data)



Source: Riley (2005), Clio Infra (2015), and UN Population Division (2019)
OurWorldInData.org/life-expectancy • CC BY
Note: Shown is period life expectancy at birth, the average number of years a newborn would live if the pattern of mortality in the given year were to stay the same throughout its life.

Child Mortality 1950–2016 (from Our World in Data)

Share of children born alive who die before they are 5 years old



Source: Gapminder (2017) & UN IGME (2018)

OurWorldInData.org/child-mortality • CC BY

Is it a simple poverty trap story?

- There are very large differences in health outcomes between rich and poor countries.
- It's tempting to think that there might be a health-based poverty trap: poverty leads to poor health, which then reinforces poverty.
- We can start by asking whether this simple story is true by using the approach from last week:
  - Remember how we tried to answer the question whether a nutrition-based poverty trap exists: we first asked whether an increase in income leads to large changes in nutrition; and then, whether changes in nutrition lead to changes in income.
- Applying this logic here, we can start by asking whether changes in income lead to large changes in health. Let's use the same cash transfer study we discussed last time.
- Remember: in that study, low-income families in Kenya received USD 709 PPP one-time unconditional cash transfers. In Haushofer & Shapiro (2016), we measured impacts after about one year on a large number of outcomes, including health. Let's look at those outcomes.

Is it a simple poverty trap story?

Haushofer & Shapiro, 2016

	(1) Control mean (SD)	(2) Treatment effect
Medical expenses per episode, entire HH (USD)	5.81	0.84
	(13.57)	(0.88)
Medical expenses per episode, spouses (USD)	7.95	−1.54
	(28.39)	(2.49)
Medical expenses per episode, children (USD)	3.70	0.59
	(5.49)	(0.55)
Proportion of household sick/injured (1 month)	0.49	0.02
	(0.31)	(0.02)
Proportion of children sick/injured (1 month)	0.44	0.01
	(0.35)	(0.02)
Proportion of sick/injured who could afford treatment	0.82	0.01
	(0.32)	(0.02)
Average number of sick days per HH member	1.81	0.06
	(3.00)	(0.18)
Propotion of illnesses where doctor was consulted	0.73	0.05**
	(0.36)	(0.02)
Proportion of newborns vaccinated	0.59	−0.09
	(0.49)	(0.07)
Proportion of children <14 getting checkup (6 months)	0.25	0.04
	(0.37)	(0.02)
Proportion of children <5 who died (1 year)	0.03	0.01
	(0.13)	(0.01)
BMI to age z-score	−0.00	0.09
	(1.00)	(0.16)
Height to age z-score	0.00	0.06
	(1.00)	(0.14)
Weight to age z-score	−0.00	0.29*
	(1.00)	(0.15)
Arm circumference to age z-score	−0.00	0.06
	(1.00)	(0.16)
Health index (children)	−0.00	−0.00
	(1.00)	(0.07)
Health index	−0.00	−0.03
	(1.00)	(0.06)

Is it a simple poverty trap story?

- Large unconditional cash transfers have very little impact on health expenditures, and generate no measurable change in illness.
- This suggests that a simple story about credit or liquidity constraints doesn't explain bad health outcomes; low income might be part of the story, but it's not sufficient as an explanation.
- I'll now present some evidence for both supply-side and demand-side problems that might provide better explanations:
  - Supply-side problems: the healthcare on offer in low-income contexts is often not very good.
    Example intervention: Community monitoring
  - Demand-side problems: lack of information, present bias, and forgetting/inattention make it hard to engage in health behaviors.
    Example interventions: incentives for immunization; water chlorination; deworming.

Fixing the supply side: community monitoring in Uganda

Björkman & Svensson, 2009

- Basic problem: Many low-income countries have far-reaching public health systems, including small health outposts even in remote villages. More recently, some even introduced free primary healthcare to improve access of even the poorest to healthcare. So lack of infrastructure *per se* is unlikely to be the problem.
- However, health outcomes are still poor in many places. Perhaps there is a "last-mile" problem related to service delivery at the clinics? Remember the examples from the book: there's a lot of absenteeism, i.e. the nurse isn't there during business hours.
- Martina Björkman and Jakob Svensson tested a "community monitoring" program in Uganda. The basic idea is that the community gets together and discusses how health service delivery could be improved (for example, absenteeism). The proposed action plan is shared and agreed upon with the clinic staff in a "community contract".
- Sample: 50 communities in 9 districts; random allocation to treatment and control.

Community monitoring in Uganda

Björkman & Svensson, 2009

Community monitoring in Uganda

Björkman & Svensson, 2009

Community monitoring in Uganda

Björkman & Svensson, 2009

Community monitoring in Uganda

Björkman & Svensson, 2009

Headline findings, 1 year after meetings:

1. Improvements in service delivery (e.g. absenteeism, waiting time) –> 20 percent higher clinic usage
2. 0.14 standard deviation (SD) increase in child weight
3. 33% reduction in U5 mortality

Breakout rooms: find these results in the tables of the paper! (Paper is posted on the course website under Lecture 6, non-required readings. https://haushofer.ne.su.se/ec2303)

Impact on utilization

Björkman & Svensson, 2009

TABLE V
PROGRAM IMPACT ON UTILIZATION/COVERAGE

Dep. variable	Outpatients	Delivery	Antenatal	Family planning	Average std effect	Use of project facility	Use of self-treatment/ traditional healers	Average std effect
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A: Cross-sectional data								
Program impact	130.2**	5.3**	15.0	3.4	1.75***	0.026*	−0.014	1.43*
	(60.8)	(2.1)	(11.2)	(3.2)	(0.63)	(0.016)	(0.011)	(0.87)
Observations	50	50	50	50	50	50	50	50
	(9)	(10)			(11)	(12)	(13)	(14)
B: Panel data								
Program impact	189.1***	3.48*			2.30***	0.031*	−0.046**	1.96**
	(67.2)	(1.96)			(0.69)	(0.017)	(0.021)	(0.89)
Observations	100	100			100	100	100	100
Mean control group 2005	661	9.2	78.9	15.2	–	0.24	0.36	–

Notes. Panel A reports program impact estimates from cross-sectional models with district fixed effects and baseline covariates as listed in Table II, with robust standard errors in parentheses. Panel B reports program impact estimates from difference-in-differences models with robust standard errors clustered by facility in parentheses. Point estimates, standard errors, and average standardized effects in specifications (1)–(5), (6)–(8), (9)–(11), and (12)–(13) are derived from equation (3). Program impact measures the coefficient on the assignment to treatment indicator in the OLS models and the assignment to treatment indicator interacted with an indicator variable for 2005 in the DD models. Specifications: First column is average number of patients visiting the facility per month for outpatient care; second column is average number of deliveries at the facility per month; third column is average number of antenatal visits at the facility per month; fourth column is average number of family planning visits at the facility per month; fifth column is average standardized effect of estimates in specifications (1)–(4) and (9)–(10), respectively; sixth column is the share of visits to the project facility of all health visits, averaged over catchment area; seventh column is the share of visits to traditional healers and self-treatment of all health visits, averaged over catchment area; eighth column is average standardized effect of estimates in specifications (6)–(7) and (12)–(14), respectively, reversing the sign of use of self-treatment/traditional healers.

*Significant at 10% level.
**Significant at 5% level.
***Significant at 1% level.

Impact on health outcomes

Björkman & Svensson, 2009

TABLE VI
PROGRAM IMPACT ON HEALTH OUTCOMES

Dependent variable	Births	Pregnancies	U5MR	Child death	Weight-for-age z-scores	
Specification:	(1)	(2)	(3)	(4)	(5)	(6)
Program impact	−0.016	−0.03**	−49.9*		0.14**	0.14**
	(0.013)	(0.014)	(26.9)		(0.07)	(0.07)
Child age (log)						−1.27***
						(0.07)
Female						0.27***
						(0.09)
Program impact × year of birth 2005				−0.026**		
				(0.013)		
Program impact × year of birth 2004				−0.019**		
				(0.008)		
Program impact × year of birth 2003				0.003		
				(0.009)		
Program impact × year of birth 2002				0.000		
				(0.006)		
Program impact × year of birth 2001				0.002		
				(0.006)		
Mean control group 2005	0.21	0.29	144	0.029	−0.71	−0.71
Observations	4,996	4,996	50	5,094	1,135	1,135

Notes. Estimates from equation (1) with district fixed effects and baseline covariates as listed in Table II included. Specification (4) also includes a full set of year-of-birth indicators. Robust standard errors in parentheses (3), clustered by catchment area (1)–(2), (4)–(6). Program impact measures the coefficient on the assignment to treatment indicator. Specifications: (1) Number of births in the household in 2005; (2) indicator variable for whether any women in the household are or were pregnant in 2005; (3) U5MR is under-5 mortality rate in the community expressed per 1,000 live births (see text for details); (4) indicator variable for child death in 2005; (5)–(6) weight-for-age z-scores for children under 18 months excluding observations with recorded weight above the 90th percentile in the growth chart reported in Cortinovis et al. (1997).

*Significant at 10% level.

**Significant at 5% level.

***Significant at 1% level.

School-based deworming in Kenya

Miguel & Kremer, 2004

WORMS: IDENTIFYING IMPACTS ON EDUCATION AND HEALTH IN THE PRESENCE OF TREATMENT EXTERNALITIES

BY EDWARD MIGUEL AND MICHAEL KREMER[1]

Intestinal helminths—including hookworm, roundworm, whipworm, and schistosomiasis—infect more than one-quarter of the world's population. Studies in which medical treatment is randomized at the individual level potentially doubly underestimate the benefits of treatment, missing externality benefits to the comparison group from reduced disease transmission, and therefore also underestimating benefits for the treatment group. We evaluate a Kenyan project in which school-based mass treatment with deworming drugs was randomly phased into schools, rather than to individuals, allowing estimation of overall program effects. The program reduced school absenteeism in treatment schools by one-quarter, and was far cheaper than alternative ways of boosting school participation. Deworming substantially improved health and school participation among untreated children in both treatment schools and neighboring schools, and these externalities are large enough to justify fully subsidizing treatment. Yet we do not find evidence that deworming improved academic test scores.

School-based deworming in Kenya

Miguel & Kremer, 2004

- Many children in low-income countries suffer from intestinal worms (92% in the baseline sample of this study). Infection can lead to anemia, listlessness, and malnutrition.
- Treatment is often cheap and widely available: treatment with de-worming pills costs less than USD 1 per child per year (in the paper, they report USD 0.49).
- In their 2004 paper, Ted Miguel and Michael Kremer study the effect of a school-baed deworming program on school attendance and other outcomes in 75 primary schools in rural western Kenya.
- The schools were randomly divided into 3 groups of 25: group 1 received free deworming treatment in 1998 and 1999; group 2 in 1999; group 3 from 2001.
  - 1998: group 1 = treatment, groups 2/3 = control
  - 1999: groups 1/2 = treatment, group 3 = control

Estimating spillover effects

Miguel & Kremer, 2004

- Important feature of the program: there is random spatial variation around each school in how many other schools/children get treated elsewhere. This allows estimating spillover effects:
- For example, compare two schools to each other: neither is receiving deworming treatment, but imagine that one school has many neighboring schools that are treated, and the other does not. If the first school has better outcomes than the second, this reflects a spillover effect (also called externality) of the treatment of its neighboring schools.

Deworming impacts on school attendance

Miguel & Kremer, 2004

TABLE IX

SCHOOL PARTICIPATION, DIRECT EFFECTS AND EXTERNALITIES[a]
DEPENDENT VARIABLE: AVERAGE INDIVIDUAL SCHOOL PARTICIPATION, BY YEAR

	OLS (1)	OLS (2)	OLS (3)	OLS (4) May 98–March 99	OLS (5) May 98–March 99	OLS (6) May 98–March 99	IV-2SLS (7) May 98–March 99
Moderate-heavy infection, early 1999						−0.028***	−0.203*
						(0.010)	(0.094)
Treatment school (T)	0.051***						
	(0.022)						
First year as treatment school (T1)		0.062***	0.060***	0.062*	0.056***		
		(0.015)	(0.015)	(0.022)	(0.020)		
Second year as treatment school (T2)		0.040*	0.034*				
		(0.021)	(0.021)				
Treatment school pupils within 3 km (per 1000 pupils)			0.044**		0.023		
			(0.022)		(0.036)		
Treatment school pupils within 3–6 km (per 1000 pupils)			−0.014		−0.041		
			(0.015)		(0.027)		
Total pupils within 3 km (per 1000 pupils)			−0.033**		−0.035*	0.018	0.021
			(0.013)		(0.019)	(0.021)	(0.019)
Total pupils within 3–6 km (per 1000 pupils)			−0.010		0.022	−0.010	−0.021
			(0.012)		(0.027)	(0.012)	(0.015)
Indicator received first year of deworming treatment, when offered (1998 for Group 1, 1999 for Group 2)					0.100***		
					(0.014)		
(First year as treatment school Indicator) * (Received treatment, when offered)					−0.012		
					(0.020)		
1996 district exam score, school average	0.063***	0.071***	0.063***	0.058	0.091**	0.021	0.003
	(0.021)	(0.020)	(0.020)	(0.032)	(0.038)	(0.026)	(0.023)
Grade indicators, school assistance controls, and time controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.23	0.23	0.24	0.33	0.36	0.28	–
Root MSE	0.273	0.272	0.272	0.223	0.219	0.150	0.073
Number of observations	56487	56487	56487	18264	18264	2327	49 (schools)
Mean of dependent variable	0.747	0.747	0.747	0.784	0.784	0.884	0.884

Deworming impacts on school attendance

Miguel & Kremer, 2004

- Deworming increases school attendance by around 5 percentage points in the simple treatment–control comparison, and about 7 percentage points if spillovers are taken into account.
- Relative to the 25 percent absenteeism rate, that's a quarter reduction in absenteeism.
- Note this has some features of a demand side problem: the treatments were always available; the project just made them easy to access.
- Possible mechanisms: a bit unclear, but lack of information may lead to parents not seeking care, or doctors mistreating.

Deworming impacts on economic outcomes 20 years later

Hamory et al., 2021

- Joan Hamory and others (including the original 2004 authors) study the impacts of the same deworming program on economic outcomes 20 years later.
- This is unique and special: very few studies have follow-up periods this long. Even more impressively, they achieve an 84% tracking rate, i.e. they manage to find and re-survey most of the original participants.
- Remember that the treatment was short and cheap: one or two years of deworming during elementary school. What are the long-term impacts of this intervention?

Deworming impacts on economic outcomes 20 years later

Hamory et al., 2021

Table 1. The 10- to 20-y deworming treatment effects on consumption and earnings, KLPS-2, KLPS-3, and KLPS-4

	(1) Full sample	(2) Female	(3) Male	(4) Older	(5) Younger
A: Annual per capita consumption (KLPS-3 and KLPS-4)					
Treatment (λ_1)	305*	89	513*	886***	−179
	(159)	(134)	(304)	(223)	(185)
Control mean	2,156	1,715	2,594	1,908	2,381
Treatment effect (%)	14.15	5.21	19.76	46.44	−7.52
Treatment *P* value	0.058	0.505	0.096	0.000	0.337
FDR q value	0.132	0.630	0.623	0.001	0.290
Number observations	4,794	2,473	2,321	2,402	2,341
B: Annual individual earnings (KLPS-2, KLPS-3, and KLPS-4)					
Treatment (λ_1)	80	41	118	258**	−75
	(76)	(62)	(133)	(108)	(100)
Control mean	1,218	674	1,728	1,177	1,242
Treatment effect (%)	6.53	6.02	6.84	21.93	−6.07
Treatment *P* value	0.297	0.515	0.376	0.019	0.451
FDR q value	0.175	0.630	0.630	0.030	0.292
Number of observations	13,624	6,826	6,798	6,791	6,780
C: Annual per capita household earnings (KLPS-4)					
Treatment (λ_1)	239*	36	439*	565**	−22
	(129)	(107)	(252)	(232)	(171)
Control mean	1,296	973	1,623	1,082	1,501
Treatment effect (%)	18.44	3.68	27.06	52.17	−1.48
Treatment *P* value	0.069	0.738	0.086	0.017	0.897
Number of observations	4,074	2,099	1,975	2,039	1,982

Deworming impacts on economic outcomes 20 years later

Hamory et al., 2021

- Deworming has large, long-term economic benefits: after 20 years, consumption is 14% higher, household earnings 18% higher.
- These are very large effects (even if somewhat imprecisely estimated), making the cost-benefit ratio of the program extremely good.
- As a result of this success, several countries have started mass school-based deworming programs. For example, India deworms over 200 million children every year!

Scaling up deworming

Hamory et al., 2021

Making water safe to drink

Null et al., 2018

- Diarrheal diseases are the second leading cause of death in children under 5
- Most of this mortality comes from water-borne diseases
- Water can easily and safely be made to drink using dilute chlorine solution. In Kenya, a month's supply costs about USD 0.25 PPP.

Dilute chlorine solution

Null et al., 2018

Why do people not chlorinate their water?

Null et al., 2018

- In rural Kenya, only about 3% of households chlorinate their drinking water
- One possible reason is that people forget about chlorination; a salient visual reminder might help.
- Null et al. (2018) developed a chlorine dispenser, which is placed at the source where people fetch their water. It provides free dilute chlorine solution, and also serves as a visual reminder of chlorination.
- Null et al. test the effect of the dispenser on chlorination and health outcomes in 1,226 villages in western Kenya, some of which are randomly chosen to receive a dispenser.

Dispensers for safe water

Null et al., 2018

Effects on chlorination

Null et al., 2018

	Active Control (N=1919)	Passive Control (N=938)	Water (N=904)
Stored drinking water has detectable free chlorine			
Enrolment	44/1529 (3%)	24/736 (3%)	20/720 (3%)
Year 1	25/847 (3%)	..	151/385 (39%)
Year 2	38/1365 (3%)	..	144/637 (23%)

Dispensers for safe water

Null et al., 2018

- Dispensers increase the use of dilute chlorine solution.
- No impacts on health outcomes in Null et al. (2018); but some evidence of reductions in child mortality in later work.
- Again, some features of a demand-side problem: chlorine was always cheap and available; the project just made it easily accessible.

A chlorine dispenser in Stockholm!

Summary

- People living in low-income settings experience worse health outcomes.
- It's unlikely to be due only to liquidity/credit constraints, although that may be part of the problem.
- Instead, supply-side factors like poor service delivery, and demand-side factors such as lack of information, present bias, and forgetting/inattention may make it hard to take up health behaviors.
- Note that even the "demand-side" factors we discussed are often remedied through infrastructure in high-income contexts: water is already chlorinated; children are vaccinated by default. In this sense, for health, the answer may lie in better infrastructure, including "choice architecture" that makes it easy to make the "right" decision.

Next week

- TWO lectures: mental health, and education
- Lecture 7: Thu 7/10 08:00–10:00, Auditorium 8, Södra huset hus D
- Lecture 8: Fri 8/10 16:00–18:00, Auditorium 4, Södra huset hus B