AREC 345: Global Poverty & Economic Development

Lecture 14:

The Demand for Prevention

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Epilogue: Early Childhood Interventions

Deworming Epilogue III: Cost-Sharing

The Primary School Deworming Project:

- Led to a reduction in likelihood of moderate to heavy infections
  - Epidemiological spillovers meant that health impacts were almost as large for those who happened to absent on day of treatment
- Increased primary school attendance...
- But had no immediate impact on academic test scores...
- **However**, new long-run evidence suggests that those who got more years of deworming in school earn 20 percent more as adults
- **Plus**, spillovers led to improvements in cognitive ability among children under two at the time of school-based deworming

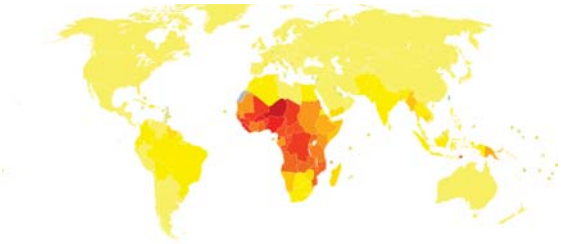
Conclusion: great program! Benefits definitely outweigh (low) costs.

Digression: Low-Hanging (Public Health) Fruit

Effective, low-cost interventions to improve child heatlh:

1. School-based deworming
2. Insecticide-treated bednets (to prevent malaria)

Low-Hanging Fruit: Bednets to Prevent Malaria



Malaria kills about 800,000 people per year, mostly African children

- Repeated bouts of malaria may also reduce overall child health
- Do these health shocks in childhood have long-term consequences?
- Countries with malaria are substantially poorer than other countries, but it is not clear whether malaria is the cause or the effect

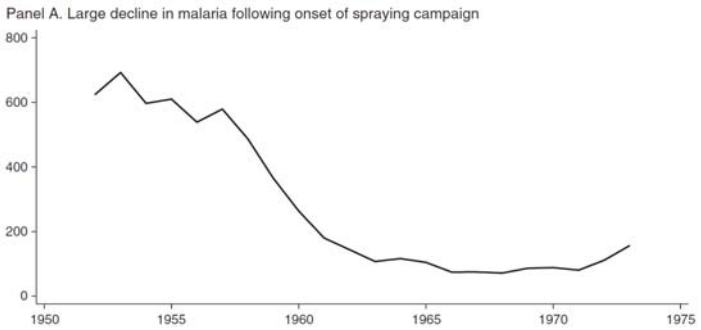
Malaria Eradication as a Natural Experiment

Organized efforts to eradicate malaria are a natural experiment

- First the US (1920s) and then many Latin American countries (1950s) launched major (and successful) eradication campaigns
- Compare trends in adult income by birth cohort in regions which did, did not see major reductions in malaria because of campaigns

Malaria Eradication as a Natural Experiment

Colombia's malaria eradication campaign began in in the late 1950s...



... and led to a huge decline in malaria morbidity

Malaria Eradication as a Natural Experiment

Areas with highest pre-program prevalence saw largest declines in malaria

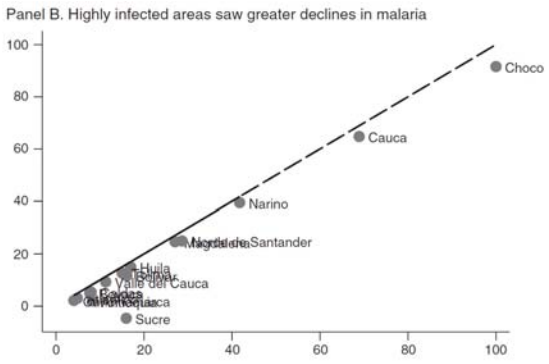


FIGURE 1. MALARIA INCIDENCE BEFORE AND AFTER THE ERADICATION CAMPAIGN, COLOMBIA

$\Rightarrow$ **Treatment**

Malaria Eradication as a Natural Experiment

In this framework, treatment is a continuous variable

- Areas with higher pre-intervention malaria prevalence were, in essence, "treated" more intensely by the eradication program
- Malaria-free areas should not benefit from eradication
- They can be used (implicitly) to measure the time trend

Exposure (during childhood) also depends on one's year of birth

- Colombians born after 1957 were fully exposed to program
  - Did not suffer from chronic malaria in their early childhood
  - Did not miss school because of malaria
- Colombians born before 1940 were adults by the time the eradication campaign began, serve as the comparison group

Estimation Strategy

Research question: do areas that had higher malaria prevalence prior to eradication experience larger income gains as malaria is eradicated?

Empirical strategy: regress changes in income across (younger vs. older) birth cohorts on pre-eradication malaria prevalence

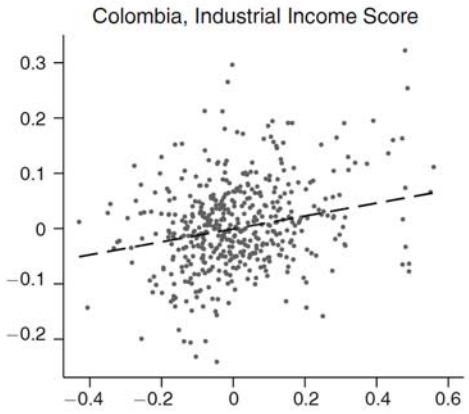
$$\underbrace{Y_{j,post} - Y_{j,pre}}_{\text{dependent variable}} = \alpha + \beta M_{j,pre} + \varepsilon_j$$

where

- $Y_{j,t}$ is an outcome of interest (e.g. years of education or literacy)
  - $Y_{j,pre}$ is average Y for those born before 1940
  - $Y_{j,post}$ is average Y for those born after 1957
- $M_{j,pre}$ is pre-eradication malaria prevalence
- ε_{ipt} is the error term

The Impact of Childhood Exposure to Malaria

Higher pre-eradication malaria exposure (on the x-axis) associated with larger increases in income across birth cohorts (on the y-axis)



The Impact of Childhood Exposure to Malaria

Regression specification:

$$\underbrace{Y_{j,post} - Y_{j,pre}}_{\text{dependent variable}} = \alpha + \beta M_{j,pre} + \varepsilon_j$$

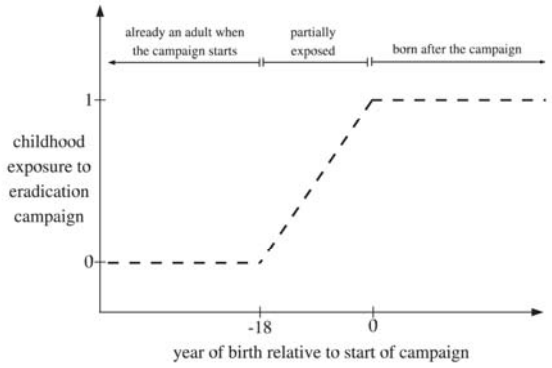
Regression results:

	Years of Education	Adult Literacy	Adult Income
Pre-eradication malaria prevalence	0.168^{*}	0.035^{***}	0.065^{***}
	(0.088)	(0.013)	(0.011)

Malaria eradication increase schooling, human capital, and wages

Exploiting (More) Variation by Birth Cohort

We gain statistical power by exploiting all of the variation in childhood exposure to treatment (eradication) across regions and birth cohorts



Exploiting (More) Variation by Birth Cohort

We gain statistical power by exploiting all of the variation in childhood exposure to treatment (eradication) across regions and birth cohorts

- Between 0 and 18 years of childhood post-eradication
- Interact exposure with pre-program malaria prevalence
- Treatment impacts should be larger for birth cohorts who spent more years of childhood malaria-free, areas with more initial malaria

Regress average income (by state) on pre-eradication malaria prevalence

- Is there a negative association before the eradication campaign?
- Does association disappear after the eradication of malaria?

Exploiting (More) Variation by Birth Cohort

Relationship between log adult wages and pre-eradication malaria rates separately by birth cohort for the U.S., Brazil, Colombia, and Mexico:

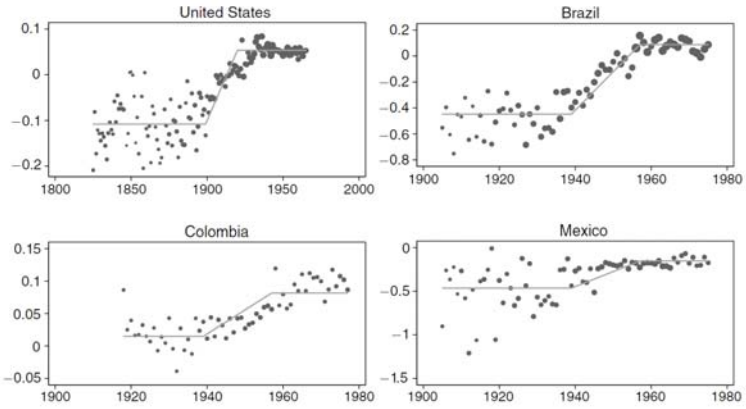


FIGURE 4. COHORT-SPECIFIC RELATIONSHIPS: INCOME AND PRE-CAMPAIGN MALARIA

Low-Hanging Fruit: Bednets to Prevent Malaria

Insecticide-treated bednets protect children from malaria

- Avoiding malaria increases adult income by up to 50 percent
- Between 2003 and 2008, Kenya's rate of postnatal mortality fell by more than 50 percent; bednets explain 39 percent of that decline

Digression: Low-Hanging (Public Health) Fruit

Effective, low-cost interventions to improve child heatlh:

1. School-based deworming
2. Insecticide-treated bednets (to prevent malaria)
3. Chlorine (for treating drinking water)
4. Oral rehydration salts (for diarrhea)

Unfortunately, this is also a list of things that many poor households seem either unwilling or unable to pay for...

Deworming Epilogue III: Cost-Sharing

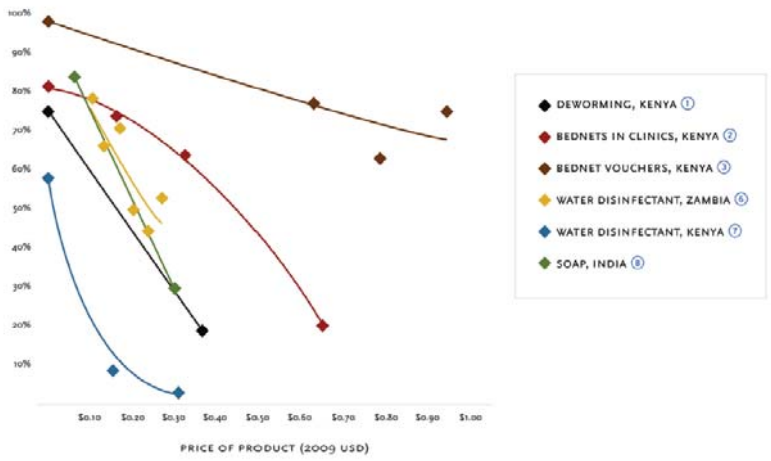
Returning to our example of the Primary School Deworming Project:

- After PSDP study, school-based deworming continued in western Kenya, but small user fees (30 cents) were introduced by NGO
  - Take-up dropped from 75 percent to 19 percent

This is an example of **cost-sharing**:

- Why introduce cost-sharing?
  - Reduce the cost of aid projects
  - Make sure goods and services are not wasted
    - Only those who value, plan to use a product will receive it
  - Demonstrate that goods are not of low quality

Cost-Sharing Reduces Demand



Economics 101: demand slopes down — unfortunately, very quickly

Does Cost-sharing Improve Targeting?

Those who paid for products are not much more likely to use them

Why Don't the Poor Pay More for Healthcare?

Private benefits of deworming outweigh costs, so why do we see such a sharp drop-off in take-up when cost-sharing is introduced?

- Small upfront costs relative to large long-run benefits
- Willingness-to-pay for effective prevention appears very low

Hypothesis: poor don't have enough money to pay for healthcare

- In urban India, people visit the doctor about 5 times per year (versus an average of 3 visits per year in the US)
- Rates are similar in other developing countries
- Poor tend to pay for treatment, not prevention

Why Don't the Poor Pay More for Healthcare?

Udaipur Rural Health Survey provides more detailed data

- Data from 1000+ households in 300+ villages in rural Rajastan
- More than 40 percent of households below the poverty line
- 46 percent of males, 11 percent of females literate
- 21 percent of households have electricity

Many individuals have untreated health problems

- Anemia, low BMI prevalent in men and women
- Substantial fraction report other chronic conditions

Why Don't the Poor Pay More for Healthcare?

Results from Udaipur Rural Health Survey:

- Respondents visit a doctor 6 times per year, on average
- Households spend 7 percent of income on healthcare
  - Most health spending goes toward treating adults
  - 60 percent of visits are to private providers, even though India has an extensive network of free health centers and hospitals
  - 20 percent of visits are to traditional healers

Unanswered questions:

- Why don't the poor pay for prevention, if they pay for treatment?
- Why do the poor choose expensive private doctors/clinics?
  - Do private clinics provide higher quality care?

The Quality of Medical Advice

Das, Hammer, and Leonard (2008) looks at the quality of medical advice given out in India, Indonesia, Paraguay, and Tanzania

- Uses **vignettes** to study medical advice:
  - Hypothetical cases: doctors receive information about symptoms, ask questions, make a diagnosis, indicate a course of treatment
  - Answers can be compared to medical best practice
- Example: a mother tells the doctor that her child has been suffering from diarrhea for two days, and she doesn't know what to do
  - What questions does the doctor ask?
  - What tests, treatments are prescribed?

Even when they know they are being watched, many doctors fail to ask many of the important questions from a diagnostic perspective

The Quality of Medical Advice

International Comparisons of Effort

Country/Effort category	*Time spent*	*Questions asked of patient*	*Number of physical exams*	*(Total number of medicines given)*
Dehli				
Doctors who exert low effort	1.9	1.36	0.97	2.13
Doctors who exert medium effort	3.36	2.94	1.0	2.72
Doctors who exert high effort	6.15	5.32	1.37	3.05
All doctors	**3.80**	**3.20**	**1.09**	**2.63**
Paraguay				
Doctors who exert low effort	5.79	5.33	1.38	1.36
Doctors who exert medium effort	7.90	7.50	2.93	1.55
Doctors who exert high effort	11.34	11.91	3.64	1.65
All doctors	**8.33**	**8.23**	**2.65**	**1.52**
Tanzania				
Doctors who exert low effort (25^{th} Percentile)	3	2	0	N/A
All doctors	**6.32**	**3.96**	**1.51**	**N/A**
Germany	7.6	N/A	N/A	N/A
Spain	7.8	N/A	N/A	N/A
Belgium	15.0	N/A	N/A	N/A
United Kingdom	9.4	N/A	N/A	N/A

The Quality of Medical Advice

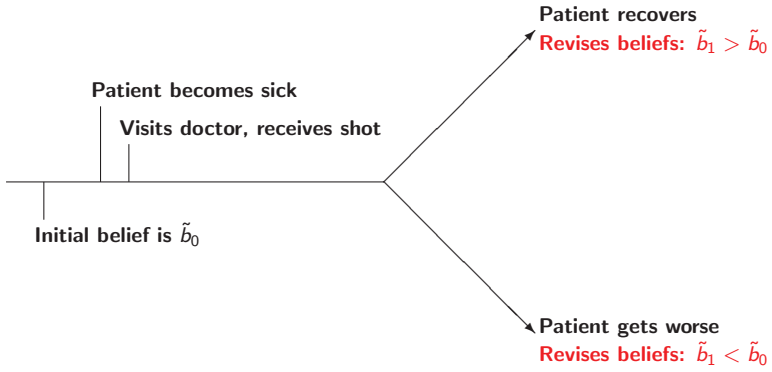
Even highly trained doctors exert low effort

- In Tanzania, 5 additional years of training only translates into a 1 percentage point increase in the likelihood of a correct diagnosis
- In all countries, private sector doctors are not, on average, any more competent than doctors working in the public sector

Going to the doctor may not make you better off

- This makes **learning about treatment** more complicated
- Patients should not trust doctors' advice
- Patients update beliefs about treatments based on their experience

Learning about Medical Treatment



Learning about Medical Treatment

Learning can lead to over-medication:

- Most illnesses eventually go away without treatment
- Patients falsely attribute their recovery to the impact of a treatment (for example, a shot) when the treatment had no real effect
- In many wealthy countries, the tendency to over-medicate is counteracted by strict rules on the prescription of drugs

Demand for Curative Treatment

Poor (sick) individuals willing to purchase treatment when:

$$\text{cost} \leq \text{perceived benefits}$$

$$c < \tilde{b}$$

where:

- c = cost
- $\tilde{b}$ = perceived benefit from treatment

How much are you willing to pay to receive no treatment?

- Partially explains why the poor prefer private doctors to public clinics — they are more likely to administer shots, IV drips, etc.
- The poor may "learn" (incorrectly) that these treatments help

Why Don't the Poor Pay More for Prevention?

Learning about preventative care is very difficult

- Receive a vaccine today... and then you don't get sick much later; **but many unvaccinated people may also remain healthy**
- In cases like deworming, effects may be even harder to measure
- Consequence: $\tilde{b}$ may be less than b (the true benefit)

Patients have to trust the medical information they receive

- Even in the US, this doesn't always happen (e.g. vaccines, autism)
- But, doctors may not be a reliable source of information

Preventative care also involves costs today, benefits tomorrow

- Evidence from psychology suggests that we put too much weight on the present, and procrastinate on important too much tasks

Why Don't the Poor Pay More for Prevention?

Preventative healthcare is an **investment good**

- Immediate costs, future health benefits

Individuals choose to make health investment whenever:

$$\text{immediate costs} \leq \text{discounted future benefits}$$

$$c < d\tilde{b}$$

where:

- $c =$ cost
- $d =$ discount factor (between 0 and 1)
- $\tilde{b} =$ perceived future benefit

Why Don't the Poor Pay More for Prevention?

Possible reasons for low willingness-to-pay for prevention:

1. Underestimation of long-run benefits (low $\tilde{b}$)
2. Under-emphasis of future benefits relative to present costs (low d)
3. High up-front costs (high c)?

High Up-Front Costs?

We've seen that financial costs of prevention are low

- In fact, many countries offer free care at gov't clinics

Prices are not the whole cost:

Make healthcare investment when:

Why Don't the Poor Pay More for Prevention?

Possible reasons for low willingness-to-pay for prevention:

1. Underestimation of long-run benefits (low $\tilde{b}$)
2. Under-emphasis of future benefits relative to present costs (low d)
3. High up-front costs (high c)?
4. Other motives (fear of western medicine, moral opposition)

Subsidies already justified by epidemiological spillovers

- Assumes that parents fully altruistic toward children
- Underestimation of future benefits, procrastination, etc. create additional motivations for the introduction of subsidies
- Subsidies can be used to lower (for example) time costs
- On the other hand, subsidies may lead to over-treatment

Vaccination Camps

Indian NGO Seva Mandir organized monthly **immunization camps** in rural villages where cocktail of jabs offered for free for young children

- Average household within 2 km of free public clinic, but high staff absenteeism means clinics are closed approximately half the time
- Goal: increase fraction of children receiving full vaccination sequence

Camps+incentives treatment offered parents 1 kg of lentils for every visit to the camps, set of metal plates for completed sequence

- Small, immediate incentive may help overcome procrastination

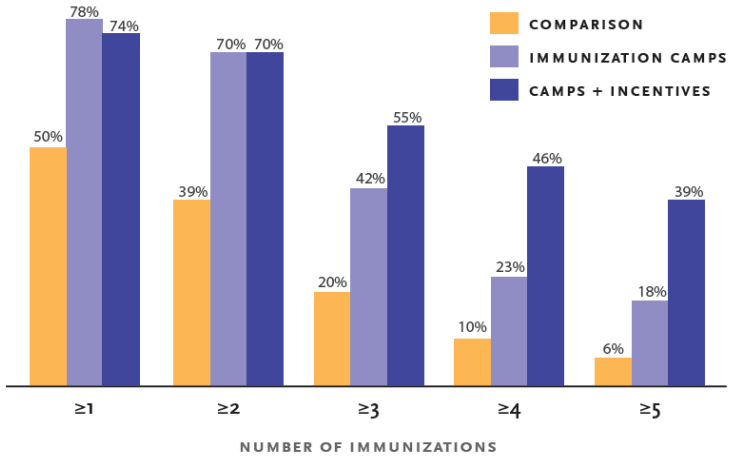
Village-level randomization: 30 villages assigned to camp and camp+incentive treatments, 74 villages assigned to control group

Vaccination Camps

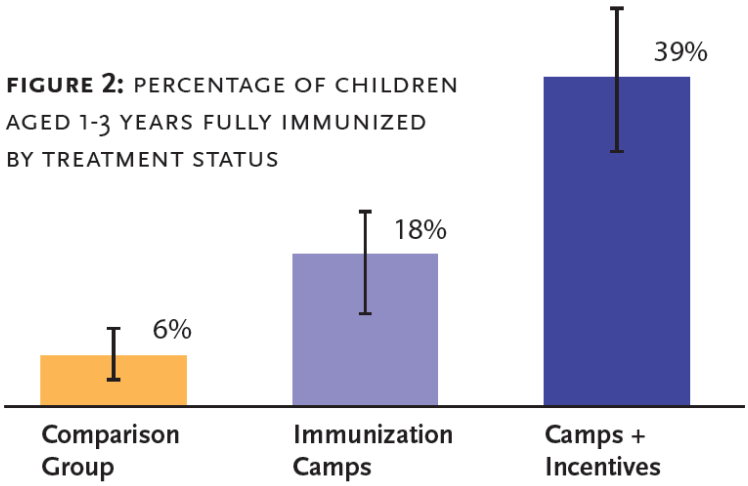
Immunization Camps: A mobile immunization team conducted monthly immunization camps in each village. Camps were generally held from 11 a.m. to 2 p.m. on a fixed date of the month. A social worker who lived in each village informed mothers of the camp and educated them on the benefits of immunization. At the first immunization, every child was given an official immunization card.

Immunization Camps with Incentives: In addition to the immunization camps described above, this intervention also offered parents a 1 kilogram bag of lentils per immunization administered, and a set of plates after their child was fully immunized. The value of the lentils was about Rs. 40 (just under US $1), equivalent to about three-quarters of a day's average wage in the area.

Vaccination Camps

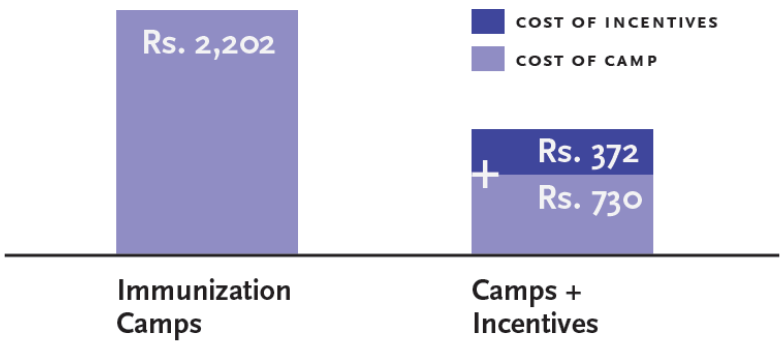


Vaccination Camps



Vaccination Camps

Cost per vaccination **lower** in camps with incentives!



Policy Lessons

- **Cost-sharing does not lead to "sustainability"**
  - In both deworming and immunization interventions, cost per child lower with the "higher cost" interventions (free meds, lentils)
- Why intervene in markets to promote preventative health?
  - Positive **externalities** from reduced transmission
  - Need to lower present costs to overcome procrastination
  - Need to subsidize behaviors with uncertain future returns
  - Need to compensate for time costs when government clinics are understaffed or plagued by absenteeism and low provider effort
- Many preventative health behaviors are subsidized or even mandated (for example, childhood vaccinations) in developed countries

Study Guide: Key Terms

- insecticide-treated bednet
- cost-sharing
- vignettes
- perceived benefits
- discount factor
- investment good
- externality