Beyond their direct health and nutrition impacts, worm infections can also affect children’s schooling.
- Anemia, lethargy and weakness make attending school and learning difficult.

This is a critical channel from the point of view of economic development: schooling leads to greater productivity and higher wages later in life.
- Schooling impacts would provide a further public policy rationale for deworming.

As in a medical trial, randomization provides a plausible method for estimating program impacts.
- On average, treatment and control groups are similar in all ways but one: the intervention.

This is also a practical approach since logistical or financial constraints often require staggered program phase-in.
- Pilot programs are an ideal testing ground for new approaches.

Rural district in western Kenya (Busia)
- Over 90 percent infected with intestinal worms (hookworm, roundworm, whipworm, schistosomiasis)
  - Treatment with albendazole and praziquantel twice per year, at < 0.50 USD per year.

75 primary schools (children aged 6-18 years), treatment was phased in over three years, in 25 schools at a time.

- Rates of serious worm infections fell by half after one year, from 52% to 25%
- Significant gains in child self-reported health, height
- Large gains in school participation: Absenteeism fell by one-quarter, or 7.5 percentage points

Externality (Spillover) Impacts of Deworming

- Deworming reduces re-infection for other community members
  - Large reduction for untreated children in treatment schools (70% of effect on the treated) and for those within 6 km of treatment schools

Taking these into account, deworming increases school participation by one year at a cost of only 3.50 USD. This provides a strong rationale for deworming subsidies.
Impacts of Deworming and Iron in India (2001-03)

- Pre-school NGO health project in slums of Delhi, India
  - 68% anemic, 24% worm infections at baseline
  - 200 pre-schools, children aged 3-6 years old
  - Treat with albendazole, iron, Vitamin A, < 2 USD/year

- Child weight improved by 0.6 kg on average
- School attendance gains of 6.3 percentage points

Impacts of Deworming in the U.S. South (1910)

- Bleakley (2007) studies the large-scale Rockefeller Foundation campaign against worms in the U.S. South
  - 40% of school-aged children were infected with hookworm in 1910

- Areas with higher hookworm infection rates prior to the intervention showed greater increases in school enrollment, attendance and literacy
- A long-term follow-up found substantial income gains

Deworming improves school participation

- Three school deworming projects – in rural Africa, urban India and the U.S. South – all led to substantial schooling improvements
  - Current research work: longer-term labor market, health, fertility outcomes in Kenya, including among those who did not directly receive deworming drugs

- How effective is deworming relative to other programs?
How should deworming programs be designed?

- **Delivery through schools is cost effective**
- **Increasing popularity of financial “sustainability” in development programs**
  - Cost-sharing drug costs with households is a natural way to implement sustainable deworming programs
  - User fees are often advocated for health programs, as well as in water and other areas

Cost-sharing for deworming drugs vs. subsidies

- 25 of 50 Group 1, Group 2 schools free treatment in 2001
- 25 of 50 Group 1, Group 2 schools cost-sharing in 2001
  - Price per household ranged from 0.40 USD for albendazole only schools, 1.30 USD for albendazole, praziquantel schools
- **Massive reduction in deworming:** 2001 take-up rate in free treatment schools 75%, in cost-sharing schools was only 18%

The illusion of sustainability?

- **Another approach to sustainability** is behavioral change through health education – in this context, washing hands, wearing shoes, and avoiding infected fresh water
  - Spending on health education the same as on drugs
  - But no observed behavioral change
- **A “sustainable” approach to deworming programs may not really be sustainable at all**
  - The truly sustainable approach is long-term free deworming treatment delivered through schools