Program impacts

• Three types of analysis:
  (1) Direct treatment effects: simple difference between treatment and comparison schools
  (2) Within-school externality impacts
  (3) Cross-school externality impacts
Cross-school infection externalities (1999)

- Large reductions in moderate-heavy infection levels within 3 km (2 miles) of treatment schools in 1999, smaller positive reductions up to 6 km
Cross-school infection externalities (1999)

• Large reductions in moderate-heavy infection levels within 3 km (2 miles) of treatment schools in 1999, smaller positive reductions up to 6 km

• An average reduction in moderate-heavy infections of approximately 20 percentage points in the study area can be attributed to cross-school externalities
Implications of treatment externalities

• Standard public finance theory: individual behaviors that generate positive externalities for other people are “under-provided”, since people do not take into account the social benefits of their actions. Thus in the absence of a subsidy, there is too little deworming.
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  → a strong rationale for public deworming subsidies
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  → a strong rationale for public deworming subsidies

• Previous randomized studies of deworming within schools showed positive but small impacts on child health, nutrition. Why? Is “deworming not worth it”? 
Within-school infection externalities (1999)

<table>
<thead>
<tr>
<th>Group 1 (Treated)</th>
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<th>Group 2</th>
</tr>
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<tbody>
<tr>
<td>0.24</td>
<td>0.34</td>
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Rate of moderate-heavy Infection, 1999
### Within-school infection externalities (1999)

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This 10 percentage point “effect” is much smaller than the 25 point effect we estimate when we compare treatment and comparison schools – and even that is an underestimate (due to cross-school externalities).
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This 10 percentage point “effect” is much smaller than the 25 point effect we estimate when we compare treatment and comparison schools – and even that is an underestimate (due to cross-school externalities).

→ Simple T – C analysis may not give reliable estimates in the presence of externalities (e.g., infectious diseases)
Drugs or behavioral change? (1999)

- Did the health / hygiene education have any impact on worm prevention behaviors? (e.g., hand washing, wearing shoes, avoiding contact with fresh water)
Drugs or behavioral change? (1999)

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<tr>
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<td>Wearing shoes</td>
<td>0.24</td>
<td>0.26</td>
<td>-0.02</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.03)</td>
</tr>
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<td>“Clean” hands, clothes (according to enumerators)</td>
<td>0.59</td>
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<tr>
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<td>2.4</td>
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Drugs or behavioral change? (1999)

• Did the health / hygiene education have any impact on worm prevention behaviors? (e.g., hand washing, wearing shoes, avoiding contact with fresh water)
  – If deworming drugs and worm prevention practices are substitutes, then taking the drugs will make kids less conscientious about avoiding exposure
Focus on the girls aged 13+

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Educational impacts – school participation
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• “School participation” data collected by enumerators during unannounced primary school visits
Educational impacts – school participation

- “School participation” data collected by enumerators during unannounced primary school visits

  Group 1 (T)  Group 2 (C)  Group 3 (C)

Younger girls, and all boys

0.84   0.73   0.77
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→ Treating worms reduces school absenteeism a lot!
Educational impacts – academic tests
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• Standardized academic exams were administered in grades 3-8 in 1998 and 1999

• Why might deworming affect test scores?
Educational impacts – academic tests

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• Why might deworming affect test scores?
  1) Increased time in school (+)
  2) Greater efficiency of learning while in school (+)
Educational impacts – academic tests

• But the average test gain from deworming is zero. Why?
Educational impacts – academic tests

• But the average test gain from deworming is **zero**. Why?
  – Congestion effects in the classroom
  – Time lags
  – Other explanations?
Cost-benefit calculations
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- Cost of a larger-scale program in neighboring Tanzania: only US$0.49 per pupil per year
Cost-benefit calculations

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• Cost of health education component (classroom lessons, teacher training) was US$0.44 per pupil per year
Cost-benefit calculations

- Deworming as a human capital investment:
  Health gains $\rightarrow$ More schooling $\rightarrow$ Higher adult wages
Cost-benefit calculations

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  - Previous study: each year of school → 7% higher wages
  - Take these gains in wages (7% x 7%) over 40 years in the workforce, discounted at 5% per year
  - Deworming benefits are at least three times (3x) as large as treatment costs (using the Tanzania costs)
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- Possible explanations:
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(2) Socio-cultural explanations / resistance to new technologies. Evidence from anthropologist Wenzel Geissler: “worms are our life”
The Impact of Higher Drug Costs

- In 1998, 1999, 2000 deworming was given for free
- In 2001, parents in 25 randomly chosen Group 1 and Group 2 schools paid US$0.10-0.30 per child
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- 2001 deworming take-up:
  Free-treatment schools: 75%
  Cost-sharing schools: 18%
• For next time: the HIV/AIDS readings