Worms: Education and Health Externalities in Kenya

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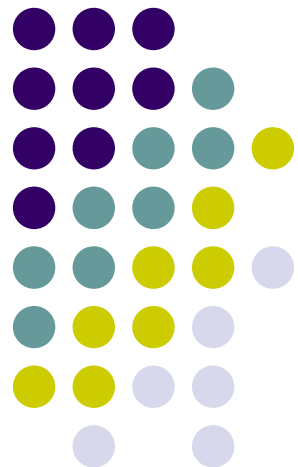


Objective

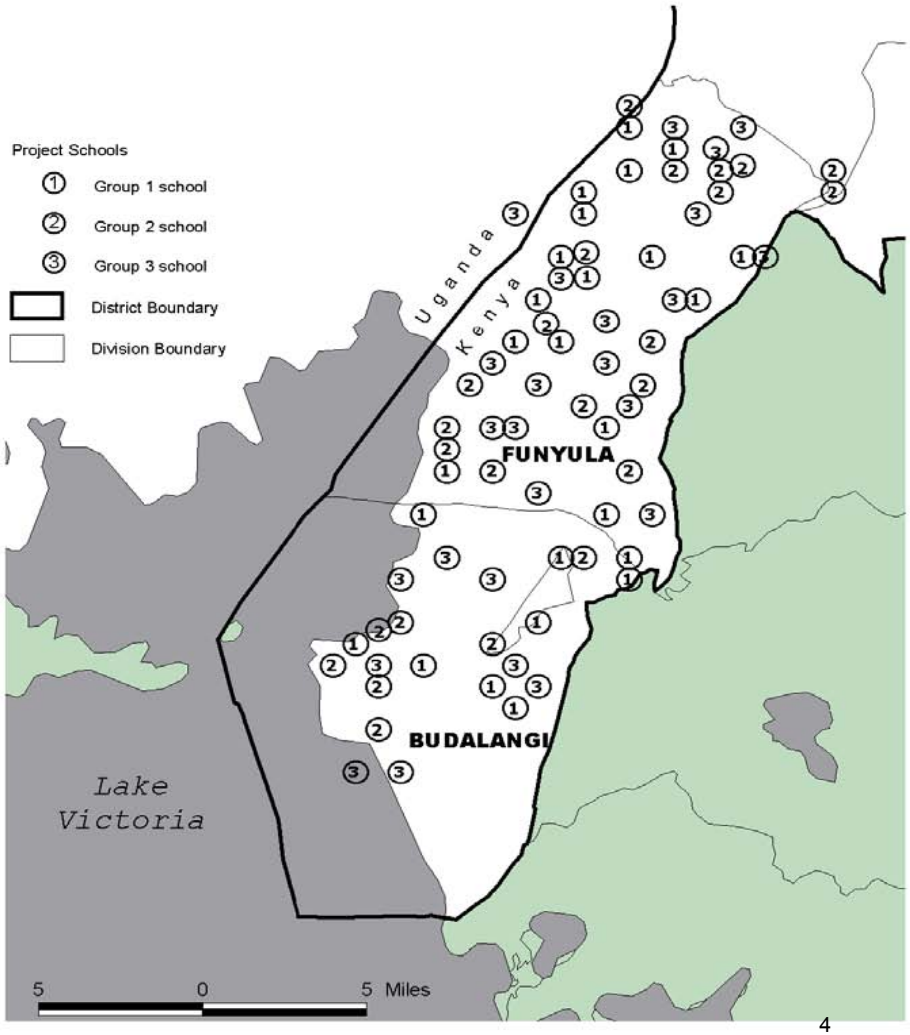
- Health (Worms) → Education (School Participation)
- To evaluate the effect of a school-level randomized deworming treatment on primary school participation by boys and girls under age 13

- Key words:
  - **Randomization** – program participation not correlated in expectation with either observed or unobserved individual characteristics
  - **Externalities** – impact on any party not directly involved in the economic decision

Worms - Background

- 3.7 billion people are infected by Intestinal Helminth (roundworm, hookworm. schistosomiasis)
- Infection rates highest amongst school-age children in Sub-Saharan Africa
- Transmission
  - contact with or ingestion of infected fecal matter
  - Infected freshwater streams or lakes (Lake Victoria)
- Effects
  - Anemia, stunting, protein energy malnutrition
- Treatment
  - Low-cost single-dose oral therapies (Albendazole, Praziquantel)

Primary School Deworming Project in Busia, Kenya



- How is randomization used in the experimental setup?

Experimental Design

- Treatment vs Control Groups
  - What might be the difference between *within school* treatment and *across school* treatment?

- Measuring effects
  - What are some of the ways you can measure effect of treatment? Is school participation okay? What else is there?

Results

- What is obvious to expect?
  - Naïve treatment effect
  - Health Externalities

Table 6: The direct health impact of deworming, January to March 1999, Group 1 schools (1998 Treatment) versus Group 2 schools (1998 Comparison)[51]

	Group 1	Group 2	Group 1 – Group 2
Any moderate-heavy infection, 1998	0.38	-	-
Any moderate-heavy infection, 1999	0.27	0.52	-0.25***
			(0.06)
Hookworm moderate-heavy infection, 1999	0.06	0.22	-0.16***
			(0.03)
Roundworm moderate-heavy infection, 1999	0.09	0.24	-0.15***
			(0.04)
Schistosomiasis moderate-heavy infection, 1999	0.08	0.18	-0.10*
			(0.06)
Whipworm moderate-heavy infection, 1999	0.13	0.17	-0.04

Table 8: Deworming health externalities across schools, January to March 1999[54]

	Dependent variable:				
	Proportion any moderate-heavy helminth infection	Proportion moderate-heavy schistosomiasis infection			Proportion moderate-heavy geohelminth (hookworm, roundworm, whipworm) infection
	OLS (1)	OLS (2)	OLS (3)	OLS (4)	OLS (5)
Indicator for Group 1 (1998 Treatment) School	-0.24***	-0.06	-0.11	-0.05	-0.24***
	(0.05)	(0.04)	(0.21)	(0.04)	(0.05)
Group 1 pupils within 3 km (per 1000 pupils)	-0.12**	-0.09**	-0.13**	-0.21**	-0.05
	(0.05)	(0.04)	(0.06)	(0.10)	(0.06)
Total primary school pupils within 3 km (per 1000 pupils)	0.00	-0.02	0.00	0.06	0.06
	(0.05)	(0.04)	(0.05)	(0.05)	(0.06)
Group 1 pupils within 3-6 km (per 1000 pupils)	-0.08	-0.09**	-0.08	-0.27***	-0.02
	(0.05)	(0.04)	(0.08)	(0.07)	(0.05)
Total primary school pupils within 3-6 km (per 1000 pupils)	0.06	-0.02	-0.03	0.09	0.12**
	(0.05)	(0.04)	(0.05)	(0.05)	(0.05)

Effects on School Participation

- Girls <13 years of age and all boys versus Girls>=13 years of age?

- Grades 1-2 versus Grades 7-8?

Table 9: School participation, school-level data[55]

	Group 1 (25 schools)	Group 2 (25 schools)	Group 3 (25 schools)		
First year post-treatment (May 1998 to March 1999)	*1st Year Treatment*	*Comparison*	*Comparison*	*Group 1 – (Group 2 & Group 3)*	*Group 2 – Group 3*
Girls < 13 years, and all boys	0.841	0.731	0.767	0.093***	-0.037
				(0.031)	(0.036)
Girls ≥ 13 years	0.864	0.803	0.811	0.057*	-0.008
				(0.029)	(0.034)
Preschool, Grade 1, Grade 2 in early 1998	0.795	0.688	0.703	0.100***	-0.018
				(0.037)	(0.043)
Grade 3, Grade 4, Grade 5 in early 1998	0.880	0.789	0.831	0.070**	-0.043
				(0.024)	(0.029)
Grade 6, Grade 7, Grade 8 in early 1998	0.934	0.858	0.892	0.059***	-0.034
				(0.021)	(0.026)
Recorded as "dropped out" in early 1998	0.064	0.050	0.030	0.022	0.020
				(0.018)	(0.017)
Females[56]	0.855	0.771	0.789	0.076***	-0.018
				(0.027)	(0.032)
Males	0.844	0.736	0.780	0.088***	-0.044
				(0.031)	(0.037)

Why would younger students face greater changes in school participation?

Figure 2: School participation rate May 1998 to November 1999 for girls under 13 years old and for all boys, difference between Group 1 and Group 3 (diamonds), and difference between Group 2 and Group 3 (squares) [62]

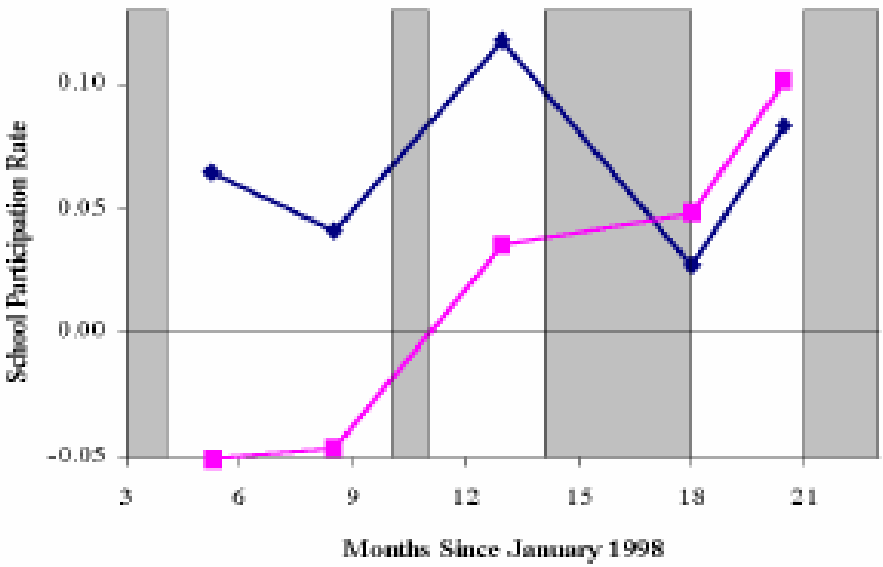
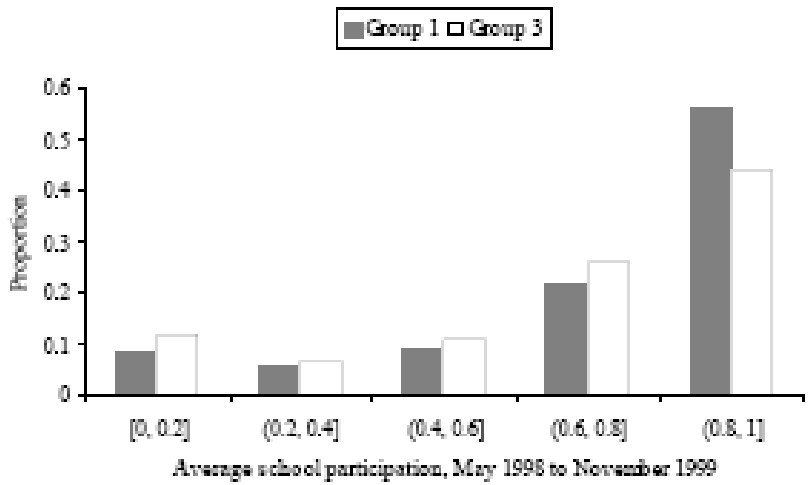


Figure 3: Average school participation rate from May 1998 to November 1999 among girls less than 13 years old and all boys, histograms for Treatment (Group 1) schools and Comparison (Group 3) schools



Implications

Should we implement a deworming treatment policy in Kenya? Is it cost effective?

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