The relationship between health and productivity

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Esther Duflo

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Estimating the relationship between nutrition and elasticity

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- ➜ Same problems as for income to health:
- ➜ Endogeneity
- ➜ Omitted variables
- ➜ Measurement
- ➜ The relationship between health and income is a case where one can think of randomly selected individuals to give them a treatment to improve their health.

The Impact evaluation question

Does a policy intervention (or an NGO program) caused a change in the outcomes of individuals exposed to the policy relative to what they would have experienced otherwise?

Potential outcome

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Let us call Y_i^T the health of an individual i if he was exposed, and Y_i^{NT} the health of the same individual if he was not exposed.

$$E[Y_i^T|\text{PROGRAM}]-[Y_i^{NT}|\text{NO PROGRAM}] = E[Y_i^T|T]-E[Y_i^{NT}|NT]$$

$$E[Y_i^T|T] - E[Y_i^{NT}|NT]$$
$$= E[Y_i^T|T]-E[Y_i^{NT}|T] + E[Y_i^{NT}|T] - E[Y_i^{NT}|NT]$$
$$= E[Y_i^T - Y_i^{NT}|T]+E[Y_i^{NT}|T] - E[Y_i^{NT}|NT]$$

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The first term is what we try to isolate (effect of treatment on the treated), the second is the selection bias.

When we compare people affected by a policy and people who were not affected, we confound the real effect of the program and the intrisic difference between people who were affected and people who were not affected.

What happens when we randomly allocate the treatment?

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Suppose that we select the individual to whom we give the iron supplement randomly within a population of individuals. We observe the test scores in both the treatment schools, and the other schools, which will form our *control (or comparison) group*.

On average, what do we expect to find if we compare the treated schools and the comparison schools before the intervention? If we compare other characteristics of these schools?

Compare $E[Y^{NT}/NT]$ and $E[Y^{NT}/T]$
$\rightarrow$ What is $E[Y^{T}/T] - E[Y^{NT}/NT]$ equal to?

Iron supplementation in Indonesia

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- ➜ Base level of anemia: figure 1
- ➜ STEP ONE: design. About 3,000 households. Households are randomly selected to be in the placebo or treatment group. Iron is distributed at home in blister packs.
- ➜ STEP TWO: Baseline comparison: table 3.
  - ➜ In which column do we see the baseline comparison?
  - ➜ What do we expect for the baseline comparison?
  - ➜ Why is it important?
  - ➜ What is the mean difference at baseline for men? for women?
  - ➜ What is the T statistic?
  - ➜ Are these differences significant?

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- ➜ STEP THREE: Protecting the design. Compliance is strictly enforced (over 90%).
- ➜ What is the right comparison? Why?
  - ➜ Those who took the pills versus all of those who did not?
  - ➜ Those who took the pills versus the comparison group?
  - ➜ All of those initially in the treatment group versus (*supposed to take the pills*) all of those initially in the comparison group (*not supposed to take the pills*)?
  - ➜ This comparison is called the INTENTION TO TREAT estimate.

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- ➜ How do we obtain the average effect on those who took the pills? (treatment on the treated).
- ➜ Note T a dummy equal to 1 if originally assigned to treatment group, and P a dummy equal to 1 if took the pill, Y the outcome

$$ITT = E[Y|T=1] - E[Y|T=0]$$

$$TOT = \frac{E[Y|T=1] - E[Y|T=0]}{E[T|T=1] - E[T|T=0]}$$

- ➜ What is the additional assumption that is necessary to make this calculation?
- ➜ Remark: Is it a program that could be scaled up? Why or why not?
- ➜ Why do we care about the results then? Why do is the TOT important in this context?

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STEP FOUR: Attrition

- What could happen to the sample if the treatment people were much healthier because of the experiment and the comparison people saw no improvement?
- How could that affect the results?
- What do we need to do to avoid that?
- In this experiment:
  - Attrition was 3%
  - Attrition was no lower in treatment group
  - Attrition is not related to baseline hb levels.

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- STEP FIVE: Results
- Effect on hb level:
- Results: figure 2, table 3: effect on hb level in blood.
  - What is column 3?
  - What is column 5? What is the difference with column 3, and which is best to use?
  - What is column 6? How does it differ? Do we expect it to be different from 5 ? What is best to use?
  - What is column 7? How does it relate to figure 2? Why do we see the pattern we see in figure 2?
  - What is column 9?

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- Do we observe what we expected?
- Tables 4 to 7: results on work, health, happiness. How do we read these results? What are the main conclusions we can draw?

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MIGUEL-KREMER: IMPACT OF DEWORMING

- One in four people worthwhile affected by worms. Treatment is either one or two pills per year. Worms affect anemia, energy level.
- Program took place in 75 rural Kenyan primary schools.
- Program design: Randomization at the school level
  - 3 groups (25 schools each) treated in 98, 99, 2001.
  - in 1998, group 1 schools are treatment schools, in 1999, group 1 and 2 schools are treatment schools.
  - Treatment schools treated for geohelminth and those with high schistosomiasis (75%) treated for it.
  - Children above 13 were not treated
  - Beginning January 1999, need parental consent
- Baseline (table 1): little difference between groups
- Treatment rates (table 3): Compliance not very high in 1999.

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Results: health outcomes

- Group 1 children less affected than Group 2 children
- They have better health outcomes
- Need to take into account externalities (worms travel)
- Table 6: Children who are untreated in group 1 are doing better than children who are untreated in group 2.
- Note: this is a non-random subset, however the bias would probably go the other way.
- Externalities across schools: table 7
- Given the externalities, what would we get if we used treatment dummy for being in a treatment school as instrument for being treated?

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Results: School participation

- Participation collected with random visits (about 3.8 per year and school).
- Table 9: regression results.
- Using treatment as instrument for illness, illness decreases school attendance by 16.9 percentage point (on a basis of about 80%).
- Not an elasticity, but a large number.

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Conclusion

Product of elasticities is less than one....

Quantitative evidence on adult health-income relationship does not suggest a poverty trap would emerge in the Das Gupta-Ray model.

However, children health may be a conduit (larger effects on one side, effect on the income-health side will be shown later).