Sanitation and health in Delhi Slums

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Conclusions

• If water enters your home from the street during the year, people in your house, especially infants, will get sick a lot.
• If your neighbors defecate in the open, you and your children will get sick a lot.
If causal, obvious policy implications

• Water comes into your house where there are no or badly maintained sewers. Well maintained sewers in cities are public goods.
  – Do you really think a connection with illness isn’t causal?
  – Who wants street water coming into their house anyway?

• People defecating in the open is an externality, particularly near you.
  – Causality is harder to prove but the relevant policy in cities may be the same anyway.
I only have two things to say about policy (Any policy. Ever.)

• Provide public goods before private goods. (Or: fix really bad market failures first.)

• Do things you can do before trying those you can’t. (Or: take constraints on government seriously.)

• You’d be surprised how bizarre these sound in health policy discussions
How does this play out in health?

• Relative priorities of publicly funded medical care versus publicly funded public goods.
  – Public goods handled in rich countries in the late 19\textsuperscript{th}/early 20\textsuperscript{th} century are still not done
  – Some 20\textsuperscript{th} century innovations increase the number of things governments in currently poor countries can usefully do but some seem to have prematurely displaced things that should come first

• Emerging evidence on the salience of sanitation, particularly in densely populated areas
Open defecation and height

Coffey, Hammer and Spears (2012)
Density of open defecation and height

Delhi
Not so impressed with the wide scatter?
Indian states in international comparison

\[ R^2 = 0.52 \]
Both overall impact and “urban-ness” imply a closer look at Delhi
Nature of sample

• Clusters of street blocks rather than simple random sample of neighborhood
• Needed to sample in groups so that we might find neighbors (mostly for the collective action motive of the study)
Health and S...tuff

Open defecation areas
Open sewers
Garbage dumps
Sewage outflow
## Some descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>Punjabi Basti</th>
<th>Kathputli</th>
<th>Noida 5</th>
<th>Noida 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>2024</td>
<td>1297</td>
<td>354</td>
<td>2207</td>
</tr>
<tr>
<td>HH's - someone with diarrhea in past 2 weeks</td>
<td>13%</td>
<td>32</td>
<td>36</td>
<td>32</td>
</tr>
<tr>
<td>Individuals with diarrhea</td>
<td>2.7%</td>
<td>6.3</td>
<td>7.3</td>
<td>6.6</td>
</tr>
<tr>
<td>General caste</td>
<td>59%</td>
<td>16</td>
<td>17</td>
<td>37</td>
</tr>
<tr>
<td>SC/ST</td>
<td>24%</td>
<td>25</td>
<td>72</td>
<td>28</td>
</tr>
<tr>
<td>OBC</td>
<td>17%</td>
<td>59</td>
<td>11</td>
<td>35</td>
</tr>
<tr>
<td>&quot;Wealth“ (not%)</td>
<td>1.68</td>
<td>-0.65</td>
<td>-0.75</td>
<td>-0.84</td>
</tr>
<tr>
<td>(Others too complicated to show but never come up in any regression anyway)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water enters home sometime during year</td>
<td>7.10%</td>
<td>47.6</td>
<td>47.4</td>
<td>55.4</td>
</tr>
<tr>
<td>Someone in HH sometimes openly defecates (OD)</td>
<td>6.4%</td>
<td>85.6</td>
<td>48.4</td>
<td>13.4</td>
</tr>
<tr>
<td># of Neighbors&lt;2.5 meters away who OD (not%, range: 0 to 3)</td>
<td>.05</td>
<td>.62</td>
<td>.45</td>
<td>.10</td>
</tr>
</tbody>
</table>
Open defecation and cases of diarrhea, Noida 8

“Heat” map – background color is derived from weighted average of people who openly defecate.

Red dots are households with cases of diarrhea, Open dots are households without.

These slipped in from a different diagram.
Results in pictures:
Diarrhea in two week period

One problem at a time

7.8 episodes/year
Falsification

- These results do not hold for any other health condition (fever, cough, accidents, childbirth)
- The sanitation variables only affect water borne disease.
- So it’s not “poverty that ‘wealth’ mis-measures” or proxy for “constitutionally unhealthy people”. Or endogenous location of sick people (unless people with gastro-intestinal illness – but no other illnesses – gravitate toward unhygienic neighbors).
One more loose end

• Maybe it isn’t just other peoples’ habits that matter but whether they also have diarrhea

• Yes, that’s a real possibility...
“Heat” map of diarrhea incidence

Clusters of diarrhea incidence match individual episodes of diarrhea even better than open defecation
Policy impact (including politics)

• Early results (not exactly right but qualitatively the same) shared with neighborhood associations
  – They knew water came into their houses but they didn’t know it could make them sick
  – They then talked to their representative (MLA) about clearing out existing drains and extending the system (Whether anything changed as a result, I can’t say).
  – This was the reaction only in the richer neighborhood

• When the neighbors’ habits were discussed they were less clear what to do about it – as is the problem with all policies requiring behavior change
Where will the money come from?

• Don’t know
• But how come this question is asked so rarely?
• I have one suggestion
Quackery and crookery for the poor in Delhi
- no matter where they go

Competence and Effort
Locality-Income and Institution

Private PHC's Hospitals
Private PHC's Hospitals
Private PHC's Hospitals

Effort of public doctor in a poor neighborhood PHC

Clinical Competence
Effort-in-Practice
Conclusions

• If water enters your home from the street during the year, people in your house, especially infants, will get sick a lot. (Sewers are public goods.)

• If your neighbors defecate in the open, you and your children will get sick a lot. (Other people’s behavior is an externality.)

Oh, right, you saw this already