the long and short of open defecation

how much can observational data tell us about sanitation and child height?

Dean Spears – r.i.c.e. & Delhi School of Economics
the importance of development in the first two years of life

one: why height?
height summarizes early life development

Indian children, 2005 DHS
height and cognitive achievement

Spears (Economics and Human Biology, 2011)
if we know about the average height of a population, we know something important about human development
two: statistical accounting for international differences

resolving an Asian enigma?
Fig. 2. Women’s height and real per-capita income.

Height, health, and development

Angus Deaton†
the Asian enigma

why are children in India shorter, on average, than children in sub-Saharan Africa who are poorer, on average?
$R^2 = 54\%$
similar omitting world regions

omits low density  omits high density
a double threat: open defecation amid high population density
returning to the Asian enigma

• why are children in India shorter, on average, than children in sub-Saharan Africa?

• individual-level data from pooling 28 Demographic and Health Surveys

• same dataset and sample used in an important recent paper by Jayachandran and Pande (2013)

  – this a different dataset from the first version of my paper; that works, too
a closer look at India

three: zooming in for causal identification
evidence from India’s TSC (2001-2011)

• government program in the 2000s that built rural latrines and incentivized local governments to motivate people to use them

• cash prize with discontinuity $\rightarrow$ effect on IMR
  – Bozzoli, et al (2009);
  Hatton (2013): IMR $\rightarrow$ height

• differential roll-out in different places
regression strategy:
IHDS cross section as a panel of births
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panel of Indian districts: NFHS 1 to 2

• did Indian districts where open defecation declined by more between the first and second DHS experience a greater increase in child height, on average?

• district fixed effects account for what is constant and different between districts
  – is this too much? doesn’t that variation matter?

• constructed district and PSU average open defecation rates from household recodes
panel of Indian districts: NFHS 1 to 2 child height-for-age z-score, under 3

All specifications include district, year, and age-in-months by sex fixed effects.
rice’s follow-up work in India

• effect on child cognitive achievement (Spears & Lamba)
• effect on calorie consumption (Duh & Spears)
• effect of childhood exposure on adult wages (Lawson, Spears, & Gupta)
• effect on child and maternal haemoglobin levels (Coffey)
• explanation of Hindu-Muslim child mortality puzzle (Geruso & Spears)
where does sanitation matter?
how does this influence our thinking about cause and effect?

**four: sanitation & population density**
sanitation should matter more where people live nearer one another’s’ feces

- combine all DHS surveys since Phase II
  - around one million live births
  - merge with population density at level of sub-national region (v024 – 1,800 of these)
- sanitation interacts with population density to predict IMR and child height
  - **robustly:** adding controls & FEs changes little
  - **uniquely:** other measures of SES don’t interact

Hathi, Haque, Pant, Gupta, Vyas, Coffey, & Spears, *in progress*
population density and effect of open defecation on IMR

Hathi, Haque, Pant, Gupta, Vyas, Coffey, & Spears, in progress
falsification: other local SES variables do not similarly interact with density
two distributions with much overlap...
but what do intervention studies study?

five: epidemiology and economics
economics vs. epidemiology?
... or, Dean attempts stand up comedy

• a standard stereotype: epidemiologists only look at small samples, only do RCTs, and only ever show you one regression model (probably with mysterious omissions and/or arrows)

• ... in fact, the two disciplines have overlapping distributions over many dimensions

• and I’ve personally learned much from interdisciplinary discussions and even collaborations
Bradford Hill criteria sound familiar to an applied microeconomist

- **temporality** sounds a lot like Granger causality, fixed effects, or event studies
- **specificity** sounds a lot like exogeneity
- **plausibility** sounds a lot like theoretical foundation
- **consistency** sounds a lot like robustness
the biggest average difference may be over intervention studies

• yes, economists like to study policy changes
  – (which may or may not be done by the researcher)

• ... but we’re equally happy to study exogenous differences in weather, close election outcomes, long-ago history, and incidental implications of policies or rules that weren’t really the point
  – unnatural experiments? (proud, not apologetic!)

• serious point: assessing whether sanitation needs to change ≠ learning how to change it
  – and even if these slides have offered a case that sanitation in India needs to change, I have said nothing about how
are intervention studies a special dilemma for sanitation research?

• **this matters:** many newspapers and policy-makers in India know about the recent Cochrane review’s conclusion that there is little evidence for an effect of “WASH” on nutrition
  – few recognize that the review only considered **intervention** studies
  – how are we biasing our answer if we privilege intervention studies? (too bad for John Snow)
  – different strengths: what is best depends on the question!
are intervention studies a special dilemma for sanitation research?

- a special, unlucky dilemma: sanitation is hard to change in India, where effect sizes may be large

- intervention $\rightarrow$ sanitation $\rightarrow$ health effect
  smaller in India smaller elsewhere

- “first stage” problem: many people in rural north India simply don’t want to use a latrine
  - there is every reason to welcome a randomized intervention study that has a big first stage!
  - both arrows big in Bangladesh? WASH Benefits takes the first stage astoundingly seriously