# Cheaper and better? Explaining a newborn-mortality advantage at public vs. private hospitals in India

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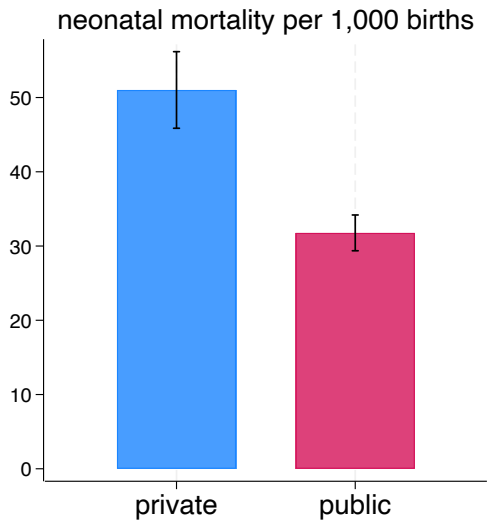
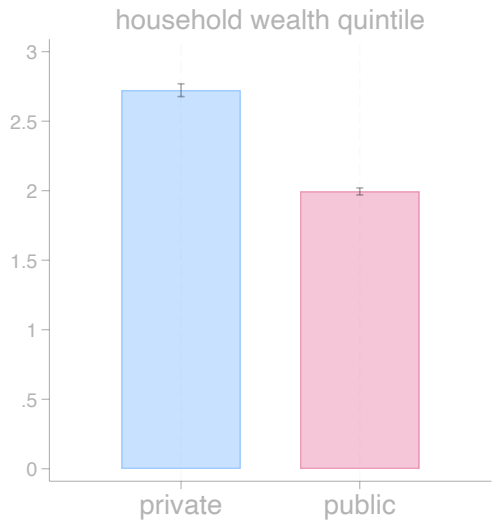
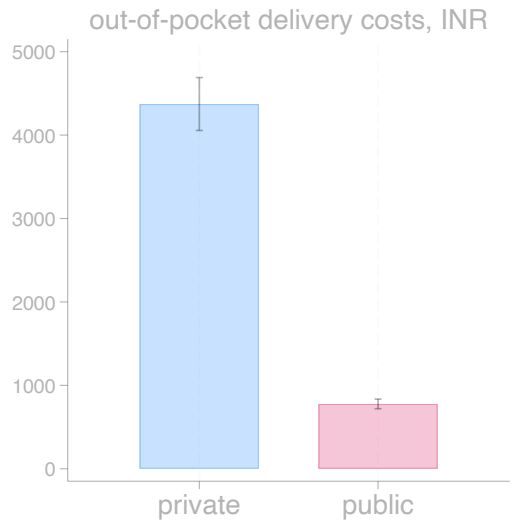
# Puzzle: Richer patients pay more to deliver in higher-risk facilities

- Neonatal mortality (NNM) is **higher** in *private* health facilities (51 per thousand) than in *public* (32 per thousand) facilities for rural residents' births in two northern Indian states: UP and Bihar

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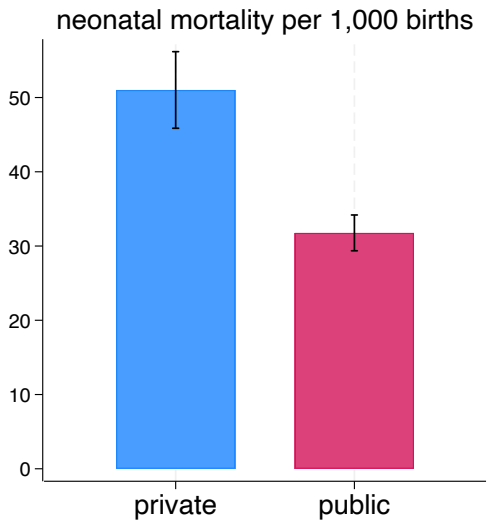


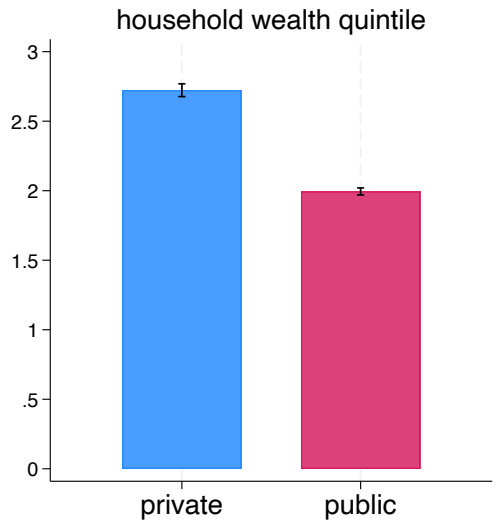


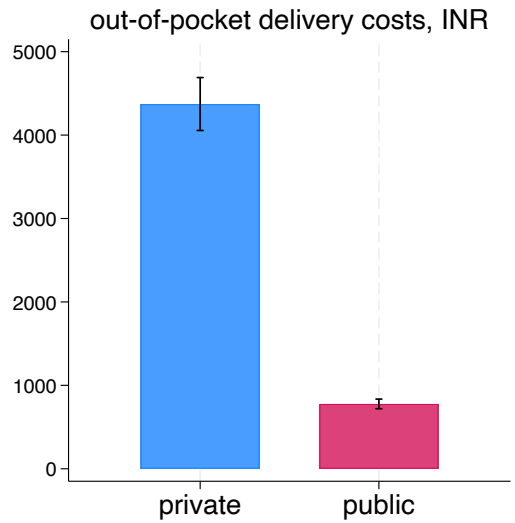


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# Possible explanations of the puzzle

- Family-level selection: Mothers who expect complications may select into private facilities
- Village-level confounding: Mothers who live in areas with more private birth may be less healthy than those in areas with more public birth
- Quality of care difference: Public providers may provide more life-saving or less harmful natal care than private providers, and causally reduce neonatal mortality

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# Do public health facilities reduce neonatal mortality compared to private facilities in this area?

# Preview of results

- Two complementary identification strategies:
  1. **Birth-mix strategy**: accounts for family-level selection by comparing village-level mortality across villages with different fractions of births in public facilities
  2. **Borders regression discontinuity strategy**: accounts for village-level selection by comparing outcomes in villages near borders between districts with different fractions of births in public facilities

- Both reveal a sizable decrease in mortality due to public delivery
  - Birth-mix strategy: 32 per thousand lower neonatal mortality
  - Borders RD strategy: 133 per thousand lower neonatal mortality (with large uncertainty)
  - Back-of-the-envelope: If private facilities had public-type care, over 35,000 net newborns' lives would be saved annually

- Evidence suggests quality-of-care practices (skin-to-skin contact) drive the effect

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# Data

# Data: DHS India

- **Data.** Nationally representative DHS surveys of India, conducted 2015–2016 (NFHS-4) and 2019–2021 (NFHS-5), with
  - mothers' and children's health behavior and outcomes—for facility of birth, neonatal mortality, and skin-to-skin contact at birth (2019–2021 only)
  - household characteristics—for demographic controls
  - village geographical coordinates—for distances to borders
- **Unit of analysis.** A birth in the five years preceding the survey whose mother lives in a rural area of Uttar Pradesh or Bihar
- **Outcome.** Neonatal mortality (month-level granularity)

# Empirical strategy 1: Birth-mix strategy

# Family-level selection can be accounted for by looking at village-level mortality

- Idea: If both facility types provide the same quality of care, then switching births across facility types will not affect village-level neonatal mortality
- But if one facility type is responsible for better or worse mortality, then the village-level neonatal mortality rate will change as the fraction born in each facility type changes

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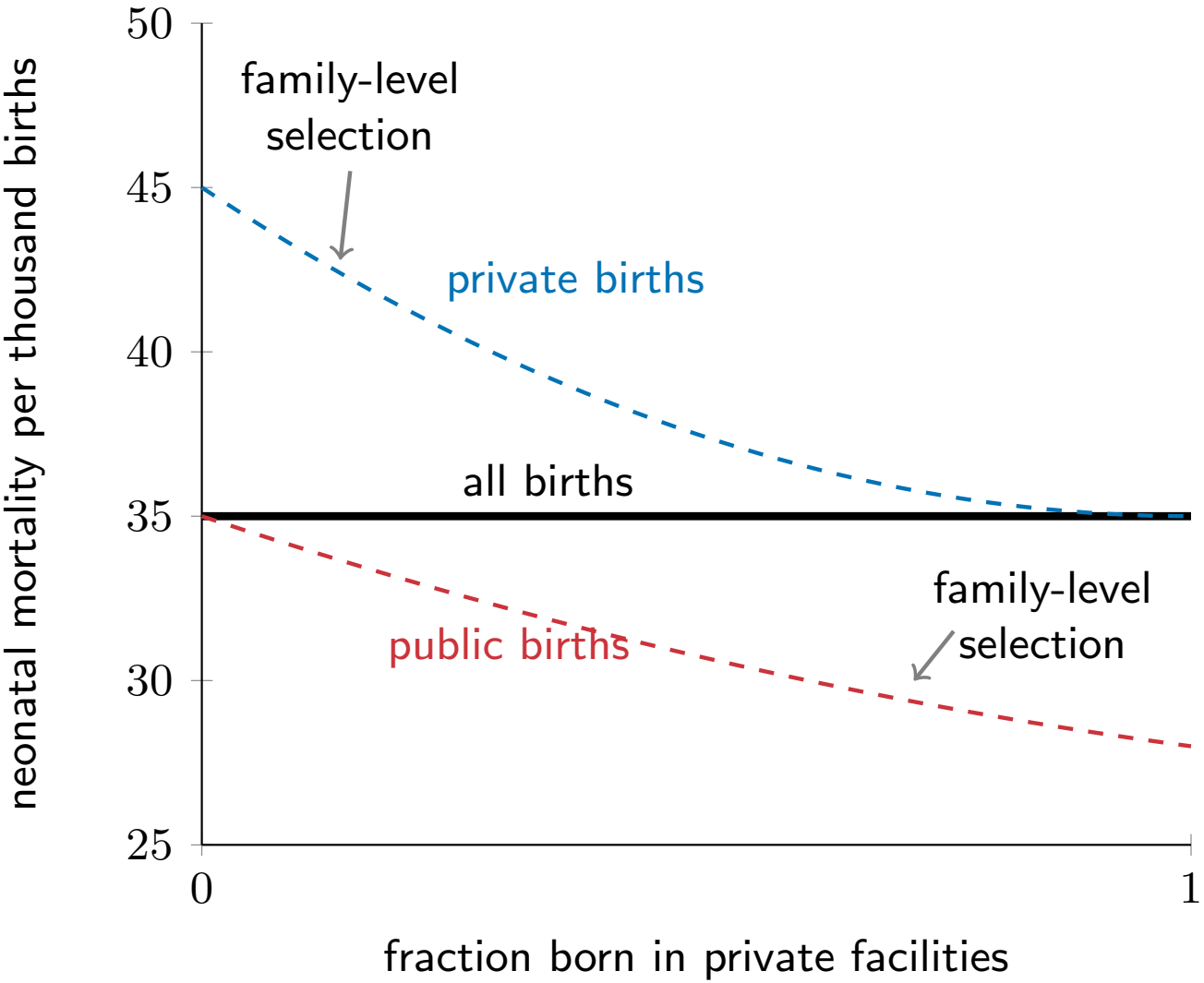
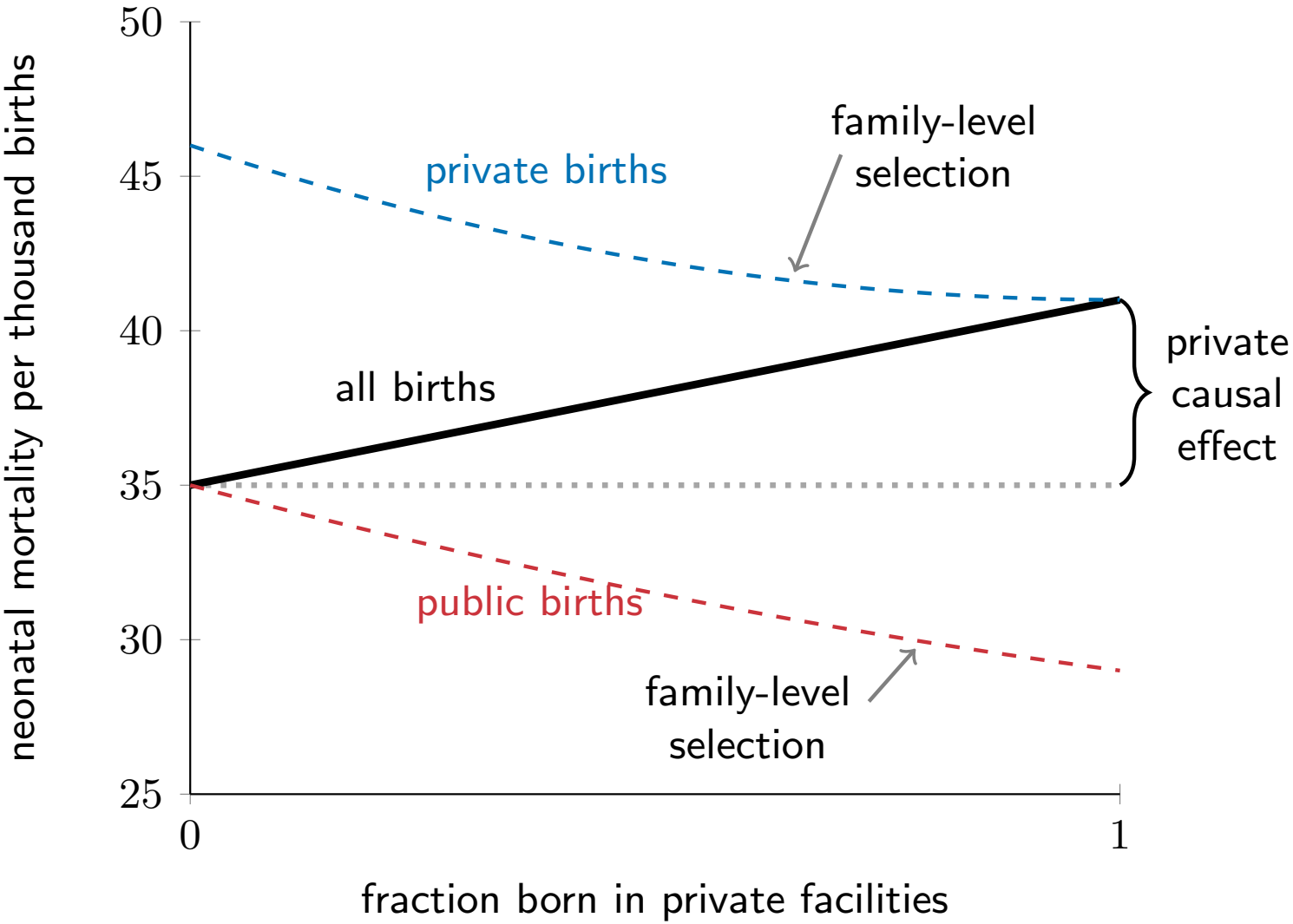
# Even with selection, if private facilities have no causal effect then the overall mortality line is flat



# The overall mortality line sloping up identifies a harmful causal effect of private delivery



# **Main result**: black line slopes up (OLS coef. with controls = 31.7, SE: 6.9), evidence for private harm

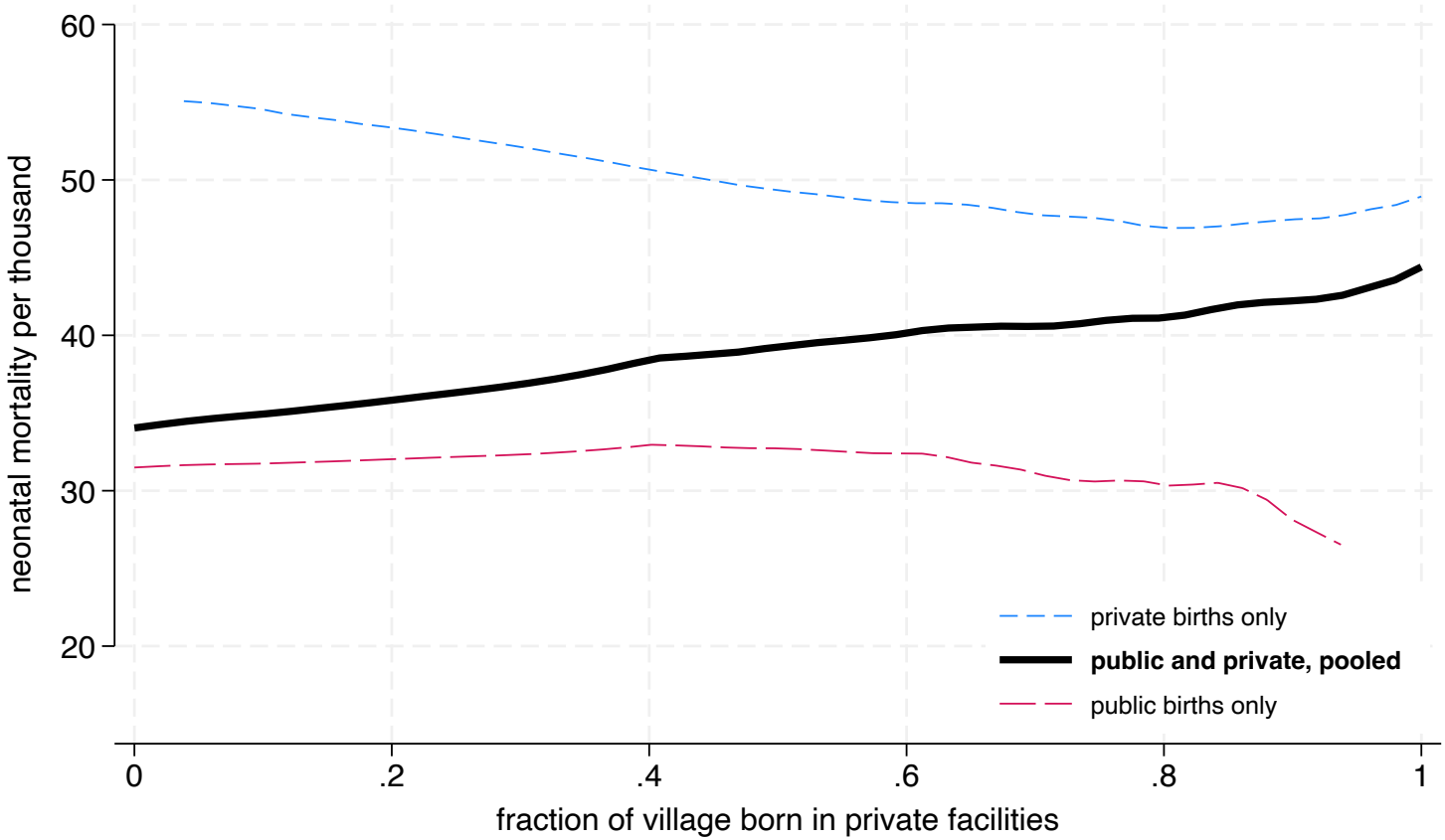



Figure: **Main result 1**—neonatal mortality vs. fraction born in private, overall and by facility type; UP and Bihar, NFHS-5.

# Village-level confounding? Villages with higher fraction born in private have *better* underlying health, against effect

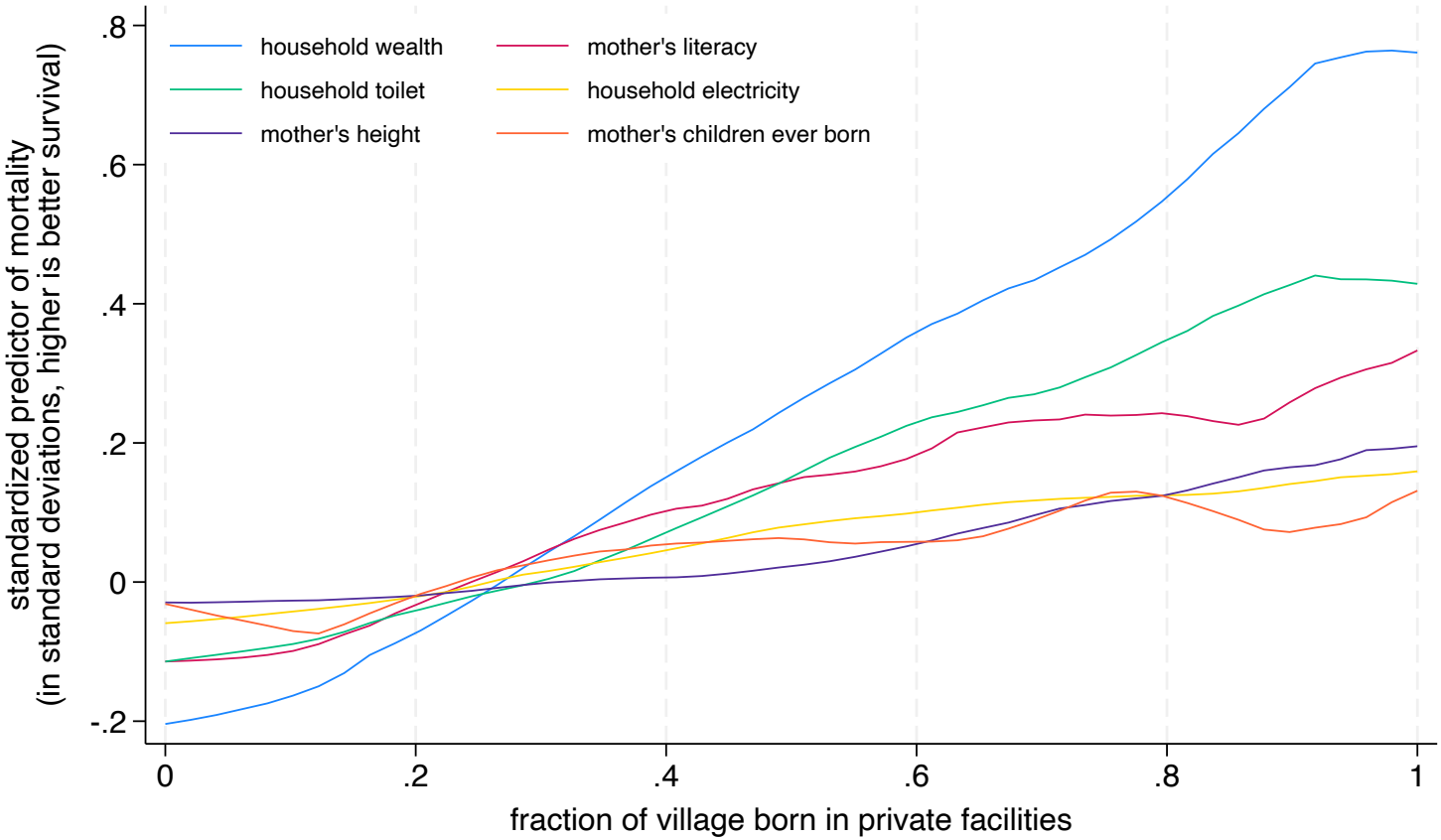



Figure: Demographic predictors of survival vs. fraction born in private; UP and Bihar, NFHS-5.

# Empirical strategy 2: Borders RD strategy

# District borders regression discontinuity design addresses village-level confounding concern

- People who live near each other have access to the same facilities and are likely to have more similar underlying health
- Cost of public care varies at the border:
  - Local health care workers help families navigate their own district
  - Conditional cash transfers are easier to redeem inside own district
  - Non-emergency ambulances function within own district
  - Referrals happen within own district

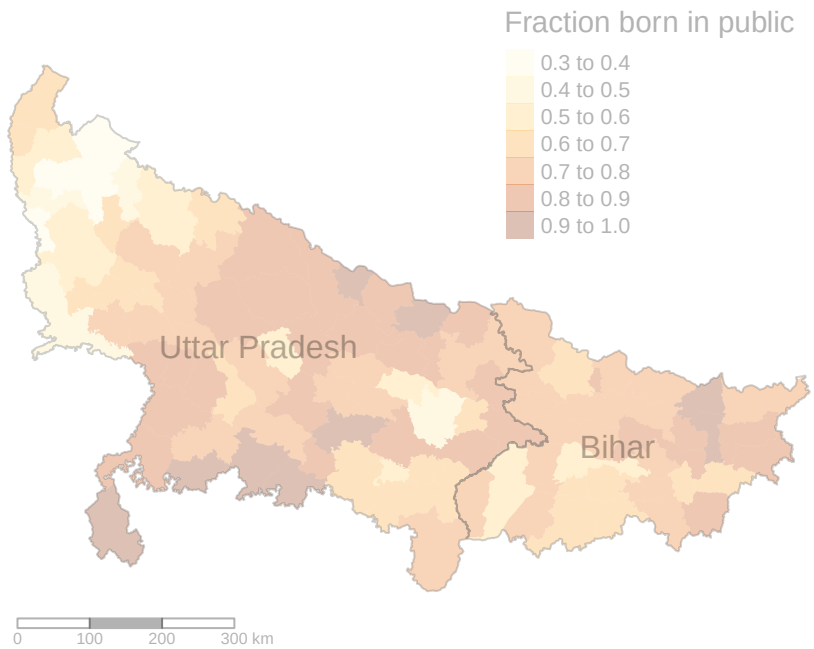



Figure: District-level variation in fraction born in public; UP and Bihar, NFHS-5

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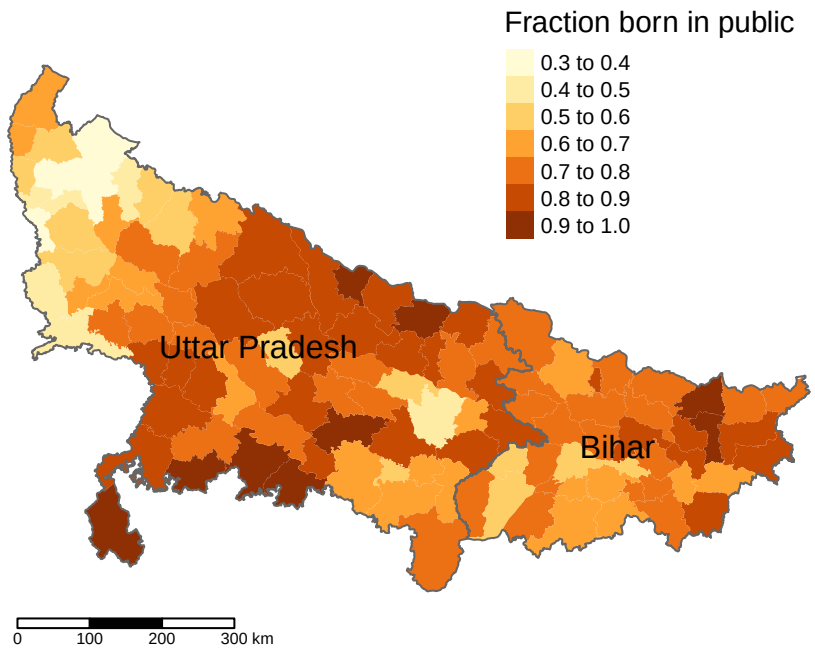


Figure: District-level variation in fraction born in public; UP and Bihar, NFHS-5

# Spatial RD across district borders

- I compare births within a narrow band ($< 8$ km) around borders, with a triangular kernel, pooling both rounds of India's DHS
- For each district border, I compare the district-level fractions born in public
  - the side with less public birth is defined to be on the negative (left) side of the border
  - the side with more public birth is defined to be on the positive (right) side of the border
- In these results, I exclude district borders with similar fractions of public birth—less than median difference (7.8 p.p.)

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# RD continuity tests—one demographic predictor of mortality is discontinuous: more OBC, less "forward caste"

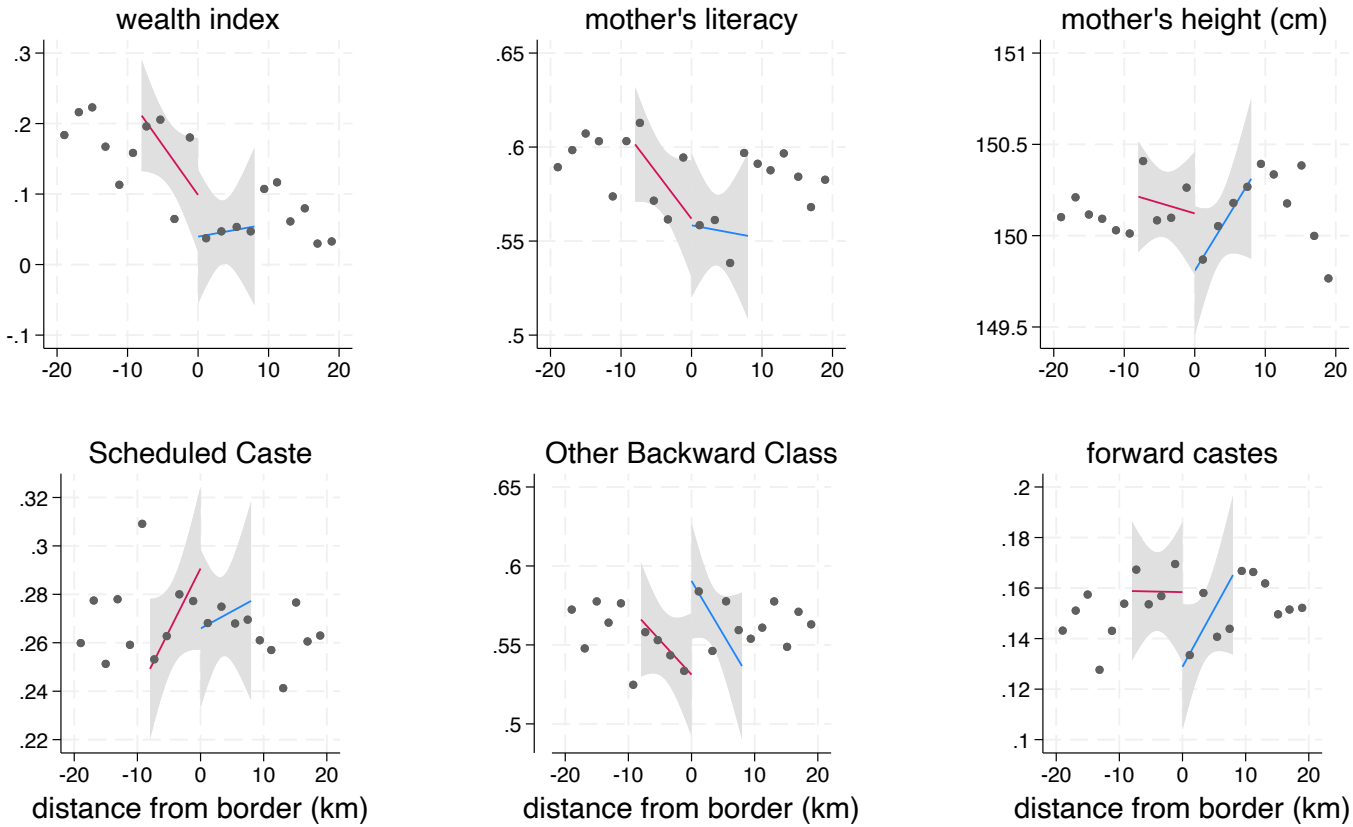


Figure: Continuity—RD, demographic predictors of mortality vs. distance from district border; UP and Bihar, NFHS-4 and NFHS-5

# RD first stage—fraction born in public increases by 9.1 (SE: 1.8) p.p. at the border

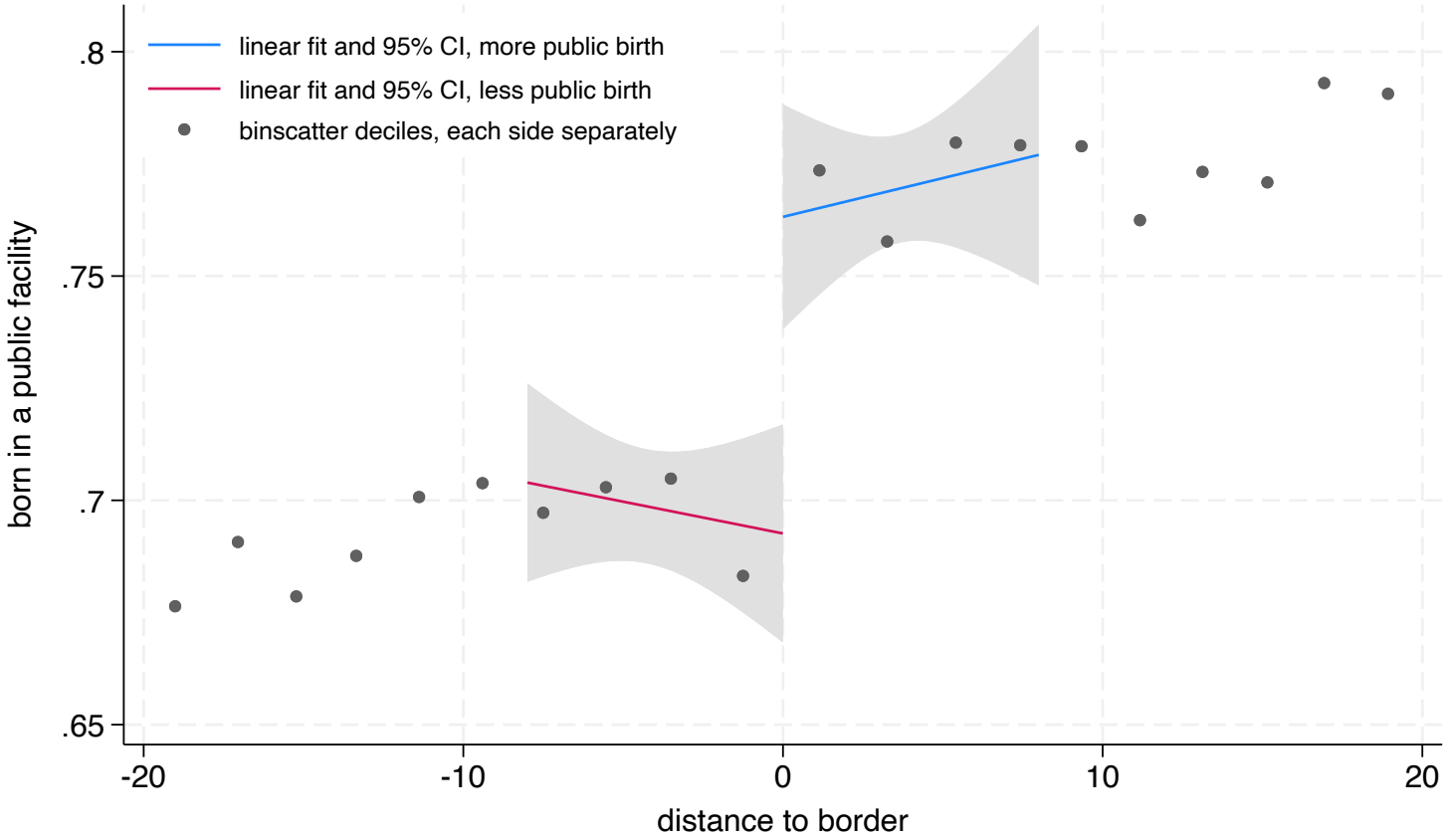


Figure: First stage—RD, fraction born in public facilities vs. distance from district border; UP and Bihar, NFHS-4 and NFHS-5

# **Main result:** RD reduced form—neonatal mortality decreases by 12.1 (SE: 5.6) per thousand at the border

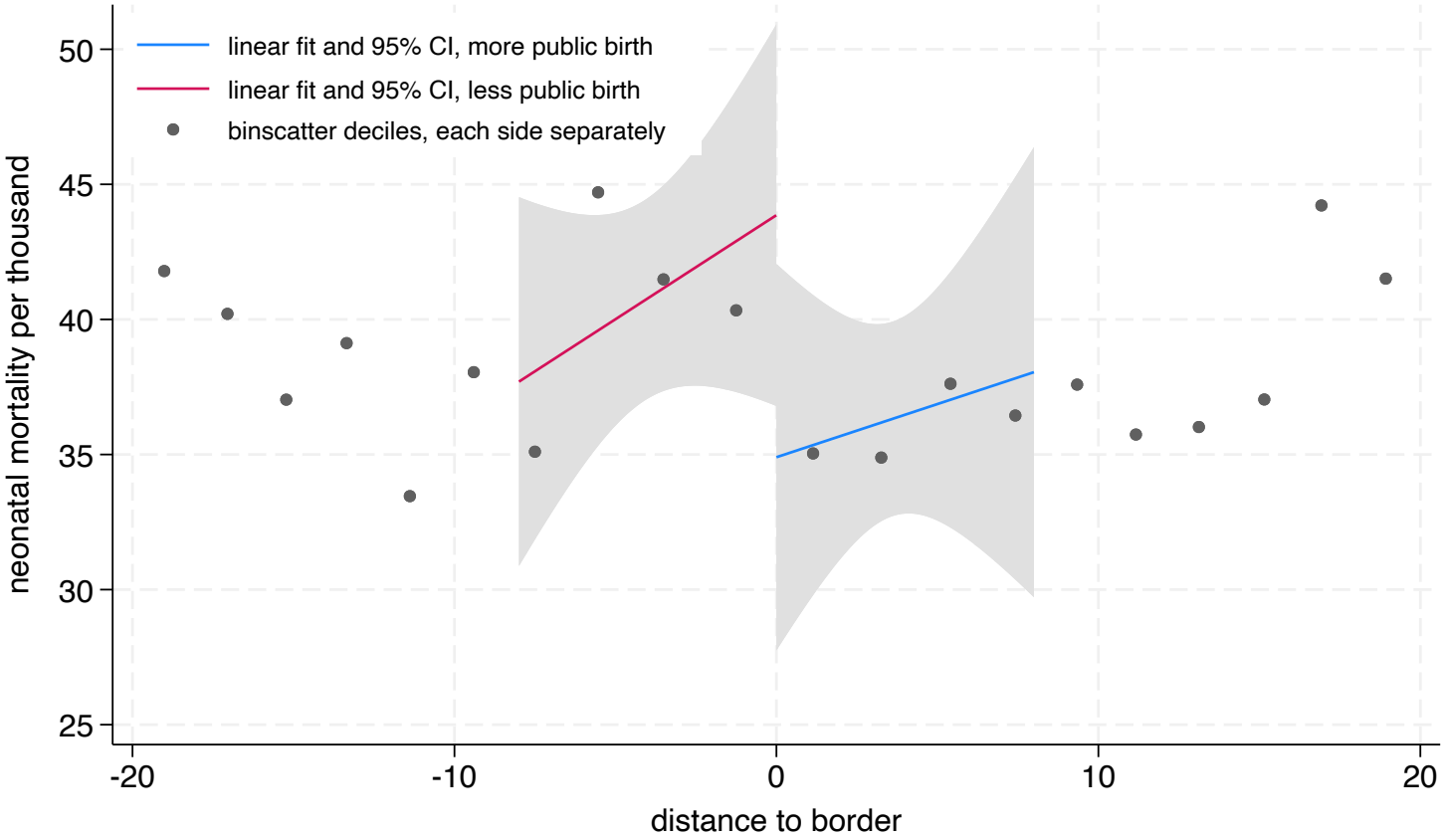


Figure: **Main result 2**—RD, neonatal mortality vs. distance from district border; UP and Bihar, NFHS-4 and NFHS-5

# Comparing fuzzy RD effect estimate to private-fraction effect estimate

- This estimate is substantially larger but substantially less certain than the first estimate

$$\frac{\text{13.3 per thousand increase in NNM at border [95\%CI: 0.3–26.3]}}{\text{10 p.p. increase in public birth at border}}$$

versus

$$\frac{\text{3.2 per thousand increase in NNM [95\%CI: 1.8–4.5]}}{\text{10 p.p. increase in public birth}}$$

- A larger effect in the RD strategy is consistent with a downward bias in the birth-mix empirical strategy from village-level selection in the opposite direction of the effect

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# Mechanism: quality of care and skin-to-skin

# What should happen immediately after a birth?

- The WHO recommends immediate skin to skin care
- Some benefits are
  - Relaxation of mother and baby
  - Stabilization of baby's vitals and temperature
  - Colonization of baby's skin with the bacteria on the mother's skin (protects against infection)
  - Stimulation of hormones that promote breastfeeding and bonding

# RD reduced form—skin-to-skin contact increases by 11.4 (3.0) p.p. at the border

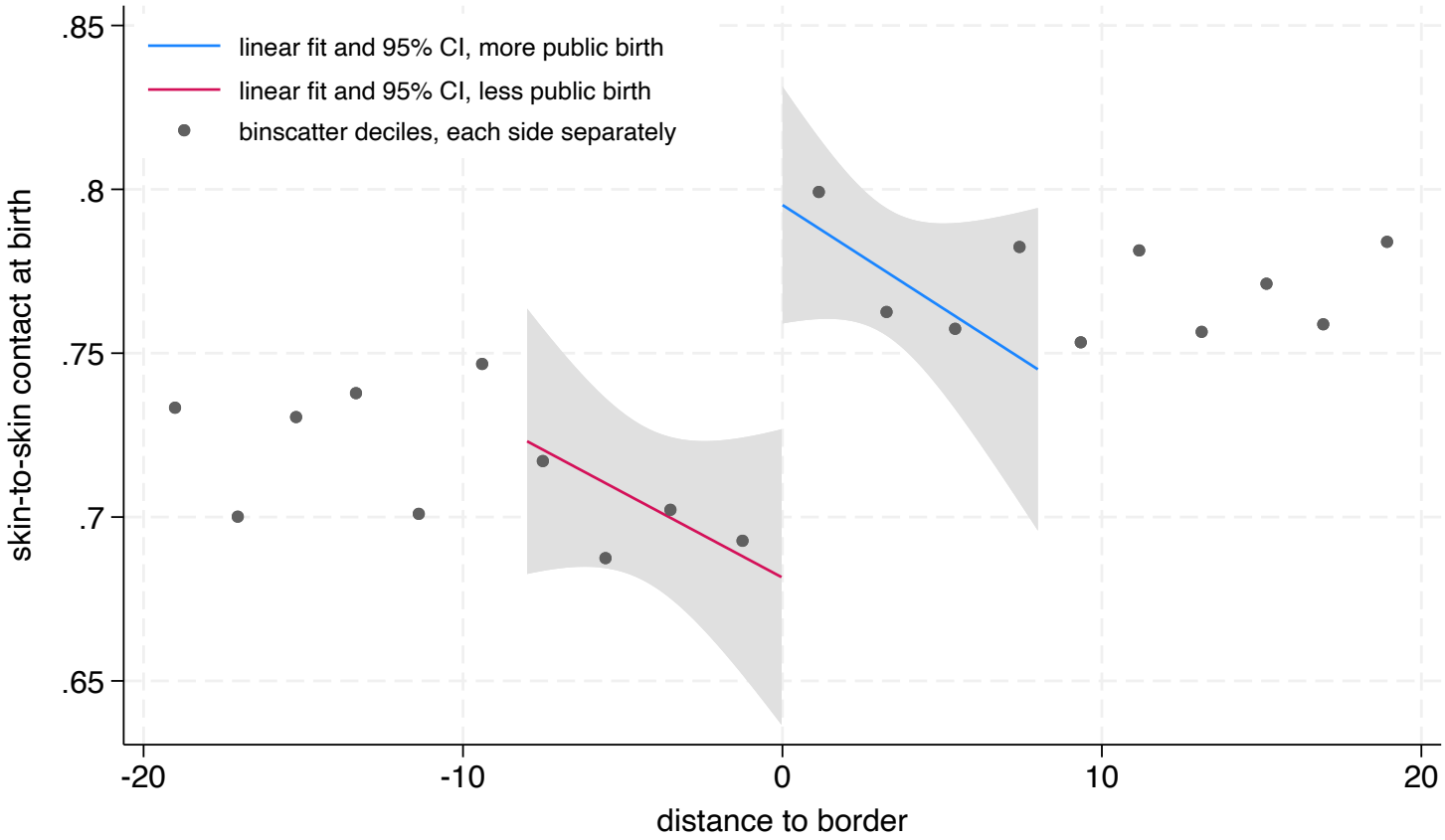


Figure: Mechanism: RD, skin-to-skin contact at birth vs. distance from border; UP and Bihar, NFHS-5

# Villages with more born in private have less skin-to-skin care

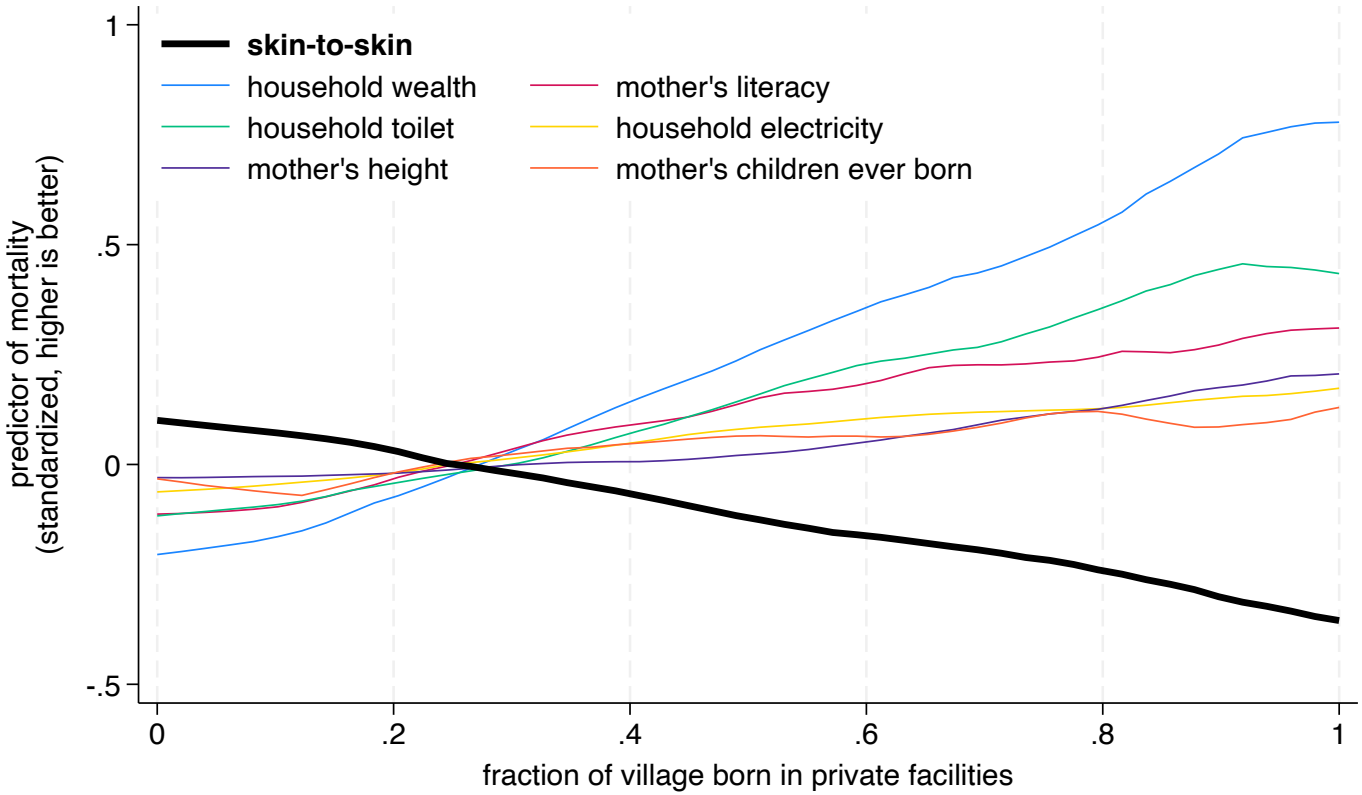


Figure: Skin-to-skin care vs. fraction born in private; UP and Bihar, NFHS-5

# Stratifying by skin-to-skin care, private-fraction of births no longer predicts mortality

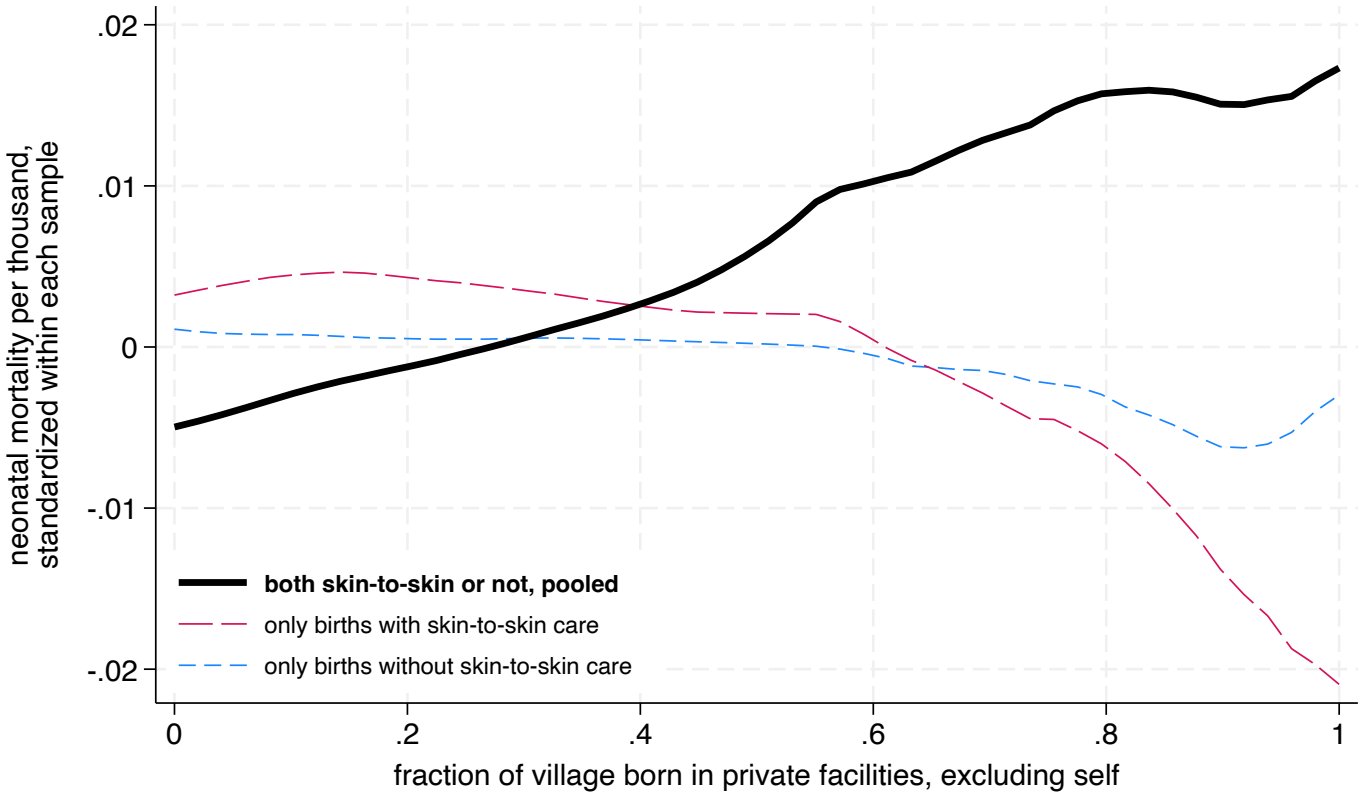


Figure: NNM vs. fraction born in private, by skin-to-skin care; UP and Bihar, NFHS-5

# Why doesn't everyone receive skin-to-skin care?

- Private providers are incentivized to provide medical services that are more profitable than skin-to-skin care
- Private providers are *de facto* unregulated, with low levels of staff competence
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# Conclusion

# Summary of results

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