What happens to babies born during health worker strikes?

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Babies die as Pumwani Maternity Hospital strike bites

Four of 16 pre-term babies referred to KNH from Pumwani Maternity died on Tuesday

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Four of 16 pre-term babies referred to Kenyatta National Hospital from Pumwani Maternity died on Tuesday from low birth weight and other congenital complications.

This came about as Kenya's biggest maternity hospital remained shut for the seventh day following a pay dispute with workers.

The news of the deaths was released by KNH's communications manager, Mr Simon Ithai.

The stand-off at Pumwani , which delivers 80 babies daily, has seen expectant women going to Kenyatta National Hospital, Mbagathi Hospital and Mama Lucy Hospital in Umoja.

When the Nation visited the 354-bed Pumwani Maternity Hospital, the wards were deserted as the management gave workers an ultimatum to return to work.

- ▶ Many health worker strikes in Sub-Saharan Africa
  - ▶ 620 strikes in data we collected across 38 countries from 1996-2015
- ▶ Popular press coverage often highlights severe health risks of strikes

- ▶ We can learn about value of standard care when care is removed

- ▶ Health facilities in developing countries are notoriously understaffed and under supplied
  - ▶ Chaudury et al. (2006): 35% absenteeism rate in low income countries
- ▶ Some question of whether they actually make people worse off
  - ▶ Paul Farmer: spread of Ebola
  - ▶ Jishnu Das: "Are Institutional Births Institutionalizing Deaths?"
- ▶ WHO and others advocate for more facility births

- ▶ Benefit (or lack thereof) of health services hard to measure
- ▶ Idea: use strikes to see what happens when usual health care unavailable

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Why study effect of strikes?
Reason 2: Natural experiment removing services, with clean identification

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Infant mortality (deaths (by age 1) per 1000)
Maternal mortality (deaths per 1000 live births)

Country	Infant Mortality		Maternal Mortality	
	2010	2016	2010	2015
Burkina Faso	66	53	4.2	3.7
Burundi	61	48	8.1	7.1
Gabon	42	34	3.2	2.9
Ghana	50	41	3.3	3.2
Kenya	43	36	6.1	5.1
Nigeria	81	67	8.7	8.1
Sierra Leone	107	83	16.3	13.6
Zambia	54	44	2.6	2.2
Zimbabwe	58	40	4.5	4.4
US	6	6	0.14	0.14
Italy	3	3	0.04	0.04
Finland	3	2	0.03	0.03

Source: World Development Indicators

- Kenya has the second largest number of strikes in SSA (after Nigeria)
- Focus on effects of strikes that occur at birth:
    - Arguably timing of strikes is exogenous to timing of birth
    - Can observe the universe of people who could have visited a facility
        - Clearly defined
        - Retrospective panel of births
        - Can test whether strikes predict differences in mothers on observables

Intuition: How can strikes change birth outcomes?

- ► Could strikes hurt?
    - ► Mother goes to health facility, health-workers are not working → Gets inferior care from someone else → Complications
    - ► Mother goes to health facility, health-workers are working fewer hours → Gets inferior care from them → Complications
    - ► Mother hears preferred health facility is closed, delivers at home or worse facility → Complications

- ► Could they help?
    - ► Visiting a health-facility (especially with limited supplies, training) risks infection → Strike encourages home birth → Fewer complications
    - ► Over-used interventions → Striking workers and closed facility make them less likely → Fewer complications

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Evidence

- Expanding access: typically find no effects
  - India: Mazumdar et al. (2012), Randive et al. (2013), Joshi and Sivaram (2014)
  - Rwanda: Okeke and Chari (2014)
  - Malawi: Godlonton and Okeke (2016)
- Removing access: few studies
  - Kenya nurse absenteeism: Goldstein et al. (2013)
  - Strikes: Ghana - Gyamfi (2011), South Africa - Bhuiyan and Machowski (2012), Kenya - Njuguna (2015), Adam et al (2018)

- ▶ Exploit exogenous timing of strikes with respect to timing of childbirth
- ▶ Estimate the impact of health-worker strikes on birth outcomes
  - ▶ Combine record of health-worker strikes with
  - ▶ Detailed (self-) reports of birth outcomes
  - ▶ Estimate using time (year-month) and place (district) FEs

- ▶ Preview of results: health-worker strikes in Kenya...
  - ▶ Reduce likelihood of child survival (up to age 5)
    - ▶ Suggestive evidence reduce health for children who survive
  - ▶ Don't change likelihood of facility births (much)
    - ▶ But do reduce early life interventions (e.g. vaccinations)
  - ▶ Effects concentrated among most likely to use facilities
    - ▶ Near facilities/Highly educated
  - ▶ Similar results in separate data from 2 urban settlements in Nairobi

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Strikes data

- ▶ Compiled our own data on strikes from digital archives of newspapers from Sub-Saharan Africa
- ▶ For each strike we know
  - ▶ start and end date
  - ▶ location
  - ▶ actor (e.g. nurses, doctors, etc)
  - ▶ grievance
- ▶ 620 strikes in 38 countries since 1996
  - ▶ 82% are local (rather than national) strikes
  - ▶ most common grievance low salaries/non-payment of salaries

Child data

- Demographic Health Surveys (2003, 2008/09, 2014)
  - nationally representative survey of women
- All children:
  - complete birth history and mortality ($N = 90,000$)
- Children 5 and under:
  - place of birth, doctor/nurse present, broad health measures, vaccination records ($N = 30,000$)
- Match to strikes data using county and birth month-year

Child data - sample characteristics

- $1/2$ of births take place in a health facility
  - 62% among those living w/in 10km of a hospital, and 33% outside
  - 64% for highly educated mothers, 27% for low ed
- Among facility births:
  - 36% have a doctor present
  - 13% c-sections
- Height and weight for age are low relative to international standards
- Vaccination rates are relatively high (90%)

Empirical strategy

► Use two sources of variation: strikes at the county*year-month level, distance to hospital at survey cluster level

► Therefore estimate the following

$$Y_{icym} = \beta strike_{cym} + \gamma_c + \delta_{ym} + \varepsilon_{icym}$$

and

$$Y_{icym} = \beta_1 strike_{cym}\, close_i + \beta_2 strike_{cym}\, far_i + \gamma_c + \delta_{ym} + \omega close_i + \varepsilon_{icym}$$

► where c indexes counties, ym birth year-months (survey FE as well)

► standard errors are clustered at the county level

► Identifying assumption: timing of conception/birth with respect to the timing of a strike is exogenous

► Check to see whether strikes predict mother characteristics – they do not

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Child Mortality

	Child died (1)	Child died first 1 month (2)	Child died first 6 months (3)	Child died first year (4)
Panel A.				
Strike	0.043 ***	0.015 ***	0.022 ***	0.036 ***
	(0.008)	(0.006)	(0.006)	(0.010)
Panel B.				
Strike*Close	0.051 ***	0.025 ***	0.026 ***	0.044 ***
	(0.009)	(0.007)	(0.005)	(0.010)
Strike*Far	0.010	-0.025 ***	0.007	0.006
	(0.016)	(0.005)	(0.027)	(0.010)
Panel C.				
Strike Frac	0.106 *	0.041	-0.007	0.035 *
	(0.060)	(0.064)	(0.011)	(0.020)
Panel D.				
Strike Frac*Close	0.130 *	0.068	0.004	0.056 ***
	(0.073)	(0.085)	(0.014)	(0.020)
Strike Frac*Far	-0.004	-0.076 ***	-0.051 *	-0.050 *
	(0.040)	(0.020)	(0.028)	(0.020)
Mean of dep. var.	0.071	0.028	0.041	0.054
Std. Dev. of dep. var.	0.256	0.166	0.198	0.226
Observations	96324	96018	93197	89740

Child health - conditional on child alive

	Height for age (1)	Weight for age (2)
Panel A.		
Strike	-0.073	0.014
	(0.087)	(0.061)
Panel B.		
Strike*Close	-0.053	0.023
	(0.100)	(0.074)
Strike*Far	-0.151	-0.022
	(0.127)	(0.101)
Panel C.		
Strike Frac	-0.482 *	-0.644 ***
	(0.253)	(0.145)
Panel D.		
Strike Frac*Close	-0.358	-0.689 ***
	(0.236)	(0.209)
Strike Frac*Far	-1.106 ***	-0.415 *
	(0.203)	(0.226)
Mean of dep. var.	-1.060	-0.910
Std. Dev. of dep. var.	1.422	1.241
Observations	28241	28241

Mechanisms: delivery outcomes

Table 7: Delivery Outcomes

	At home (1)	In any public facility (2)	At government hospital (3)	At private facility (4)	Doctor or Nurse present (5)
Panel A.					
Strike	0.027	-0.018	-0.014	0.007	-0.004
	(0.020)	(0.031)	(0.026)	(0.026)	(0.015)
Panel B.					
Strike*Close	0.002	-0.002	0.001	0.011	0.019
	(0.012)	(0.024)	(0.026)	(0.026)	(0.015)
Strike*Far	0.139 ***	-0.088	-0.082	-0.009	-0.106 ***
	(0.052)	(0.064)	(0.051)	(0.026)	(0.015)
Panel C.					
Strike Frac	0.084 ***	-0.074	-0.034	-0.005	-0.024
	(0.033)	(0.081)	(0.082)	(0.092)	(0.051)
Panel D.					
Strike Frac*Close	0.059	-0.038	0.009	-0.017	0.014
	(0.040)	(0.084)	(0.096)	(0.092)	(0.051)
Strike Frac*Far	0.222 ***	-0.265	-0.264 ***	0.063	-0.228 ***
	(0.089)	(0.229)	(0.073)	(0.092)	(0.051)
Mean of dep. var.	0.444	0.381	0.339	0.115	0.509
Std. Dev. of dep. var.	0.497	0.486	0.473	0.319	0.500
Observations	32647	32647	32647	32647	32664

Mechanisms: Early interventions - conditional on child alive

	Has Health Card (1)	Tuberculosis (2)	Diptheria (3)	Polio (4)	Measles (5)
Panel A.					
Strike	-0.013 *	-0.015	-0.017	-0.023 *	-0.038 ***
	(0.007)	(0.014)	(0.019)	(0.014)	(0.011)
Panel B.					
Strike*Close	-0.019 **	-0.023 *	-0.022	-0.030 ***	-0.050 ***
	(0.009)	(0.013)	(0.020)	(0.011)	(0.011)
Strike*Far	0.011	0.016	0.004	0.003	0.009
	(0.016)	(0.029)	(0.010)	(0.012)	(0.011)
Panel C.					
Strike Frac	-0.026	-0.077	-0.102 ***	-0.098 ***	-0.145 ***
	(0.029)	(0.076)	(0.041)	(0.017)	(0.037)
Panel D.					
Strike Frac*Close	-0.030	-0.082	-0.121 ***	-0.116 ***	-0.201 ***
	(0.031)	(0.078)	(0.036)	(0.023)	(0.037)
Strike Frac*Far	-0.007	-0.056	-0.010	-0.010	0.131 ***
	(0.026)	(0.120)	(0.030)	(0.038)	(0.037)
Mean of dep. var.	0.947	0.917	0.903	0.908	0.709
Std. Dev. of dep. var.	0.224	0.276	0.296	0.290	0.454
Observations	30992	31054	31048	31011	31019

Robustness

- ▶ Very similar pattern if instead split sample by education level of mother
- ▶ Robust to inclusion of survey cluster FE or mother FE
- ▶ Find increased deaths of children born during strikes using Nairobi Urban Health & Demographic Surveillance System

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- Find increased deaths of children born during strikes using Nairobi Urban Health & Demographic Surveillance System

- Data from 2 urban settlements (Korogocho and Viwandani) in Nairobi near hospitals with frequent strikes (e.g. Pumwani Maternity Hospital)

    - longitudinal data collected every 4 months from 2002-2012
    - fertility, mortality, migration, income
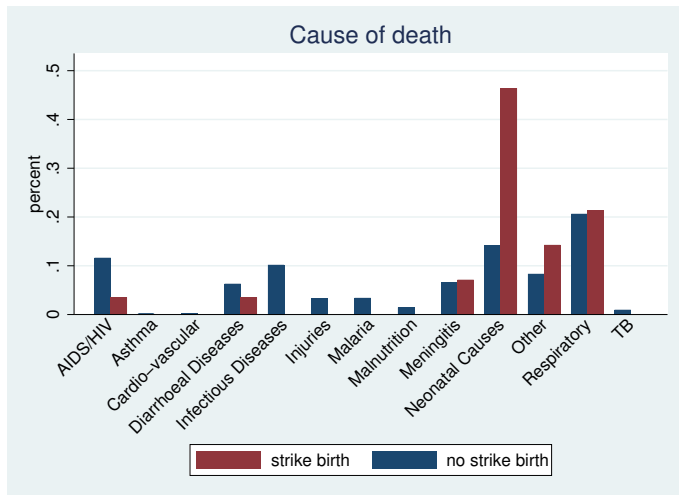- Can match exact date of birth to strike days
- Verbal autopsy for cause of death
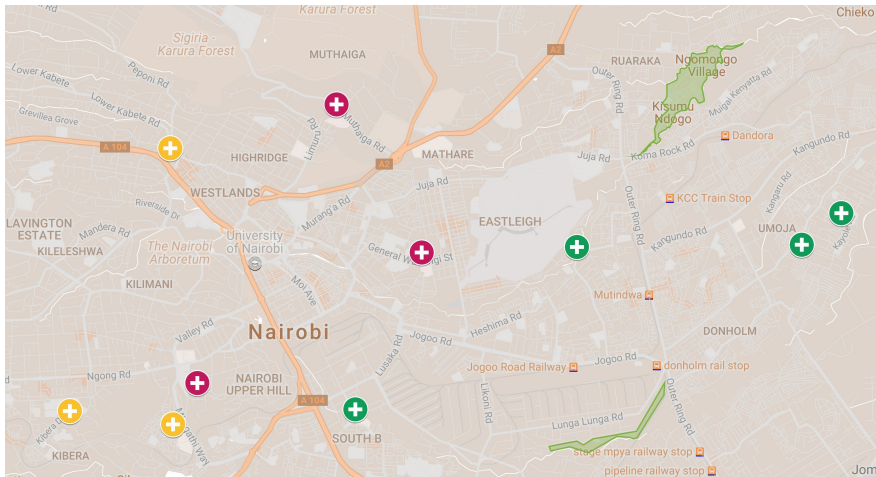
Child mortality

	Child died first 1 month (1)	Child died first 6 months (2)	Child died first year (3)
Strike	0.015 ***	0.024 ***	0.017
	(0.006)	(0.009)	(0.012)
Mean of dep. var.	0.019	0.036	0.062
Std. dev. of dep. var.	0.135	0.186	0.242
Number of observations	23181	21050	18314

Cause of death

Cause of death

Discussion/Conclusion

- Shown that children born during strikes are more likely to die early in life
  - neonatal conditions driving deaths (NUHDSS autopsy data)
  - suggestive evidence health among survivors worse (DHS)
- Does not appear fewer facility births is a mechanism (except among lower educated mothers)
  - not always the case that hospital shuts down; often alternative hospitals nearby
  - but plausibly lower quality conditions in either case
- Evidence this is the case: less likely to receive health card, vaccinations
  - potentially other important early interventions missed as well

- ▶ Implies an important value to the usual health services being provided
  - ▶ Does not necessarily imply an appropriate policy response would be to encourage more use of health services everywhere
  - ▶ Analysis is limited in looking at long-term benefits of the resolution of a strike
    - ▶ If increases motivation and attendance of health-workers, the long-term benefit could easily be positive