

# The Unintended Consequences of the Village Midwife Program in Indonesia

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# Motivation

- Importance of *in utero* environment and nutrition (Almond and Currie. 2011).
- Selection in live birth and fetus quality.
- Early life shocks may influence quality and likelihood of live birth.
- Gender difference in quality and likelihood of live birth (Eriksson et al. 2010).
- Implications for:
  - Human capital formation.
  - Parental response to *in utero* shocks.
- Lack of causal studies specially in developing countries.

# Midwife: Intended Consequences

- Government initiated the midwife program in 1989.
- Allocated midwives over time.
- Primary goal: improve health of reproductive age women.
- Duties:
  - Promoting community participation in health.
  - Providing health and family services.
  - Working with traditional birth attendant.
  - Referring complicated obstetric cases to health centers.
- Improved BMI of the reproductive age women (Thomas and Frankenberg 2001).

## Male fragility *in utero*

- Males experience:
  - Higher neo-natal mortality than females (Bhaumik et al. 2004).
  - Neo natal mortality reflects *in utero* environment (Almond et al. 2011).
  - Higher fetal mortality than females (MacDorman and Kirmeyer 2007).
- *In utero* environment and likelihood of a male birth (Song 2012, Valente 2015, Sanders and Stoecker 2015).

# Research Questions

- Does maternal health intervention influence the likelihood of a male birth?
- Which type of mothers are more influenced by such an intervention?
- How does it affect child birth endowment?

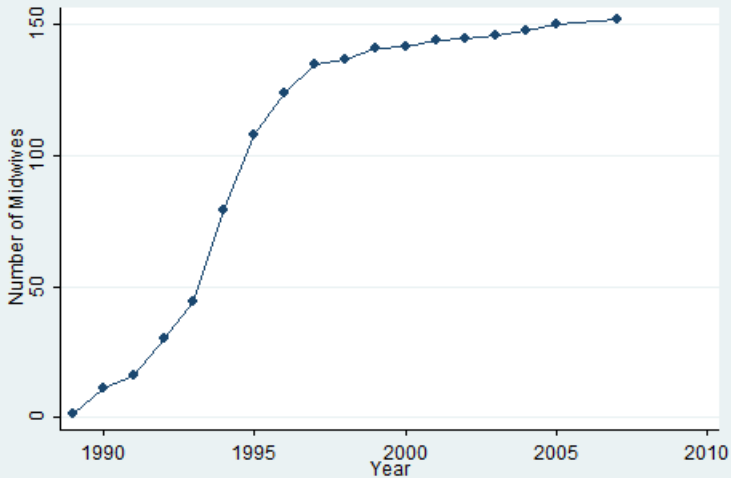
# Results Preview

- Midwife program:
  - Leads to an increase in live birth by 4 percentage points.
  - Impact is more pronounced among mothers with primary and below level of education.
  - Midwife program is associated with lower birth weight for males but not for females.
  - Males are more likely to experience mortality as an infant than females.
- No evidence fertility selection.
- No evidence gender differential reporting of male birth weights.

# Indonesian Family Life Survey

- Four waves: 1993, 1997, 2000, 2007.
- First wave (1993-94): represented 83 % of the population.
- First Wave (1993-94): 7224 households were interviewed.
- Information on midwife placement year: wave 2 to wave 4.
- Pregnancy history—primarily restrict recall period upto last five years.

Over time Midwife Allocation







# Empirical Challenges

- Endogenous program placement.
- Fertility Selection, migration and mortality attrition.
- Trend difference.

# Empirical Strategy

$$O_{ijmt} = \beta_1 \text{Treated}_{jt} + \beta_2 X_{ijmt} + \beta_3 \theta_{jt} + \gamma_m \times \delta_t + \theta_j + \epsilon_{ijmt}$$

- $O_{ijmt}$  is the outcome of interest for child  $i$  who is born in month  $m$  and year  $t$  and whose mother lives in community  $j$ .
- $\theta_{jt}$  includes set of time varying community observables such as paved road status, urban status, public phone status, distance to market, distance to District Capital Center, number of health posts, community electricity status and distance to nearest health facility.
- $X_{ijmt}$  is a set of mother level observables such as mother education and mother age at the time of survey.
- $\gamma_m$  is birth month fixed effect.
- $\delta_t$  is birth year fixed effect.
- $\theta_j$  is community fixed effect.
- Variant model: replace Treated with Years of Exposure.

## Summary Statistics

	Mean	S.D.	N
Male Child	0.515	0.500	8420
Mother Years of Education	6.641	3.577	8420
Mother Age at Birth	31.17	6.678	8420
Birth Weight (in kilos)	3.163	0.592	6251

# Impact of The Village Midwife Program on Likelihood of Male Birth

	Birth Cohort:1989-99 & 2003-07			Birth Cohort: 1987-2007		
	(1)	(2)	(3)	(4)	(5)	(6)
Treated(=1)	0.040*	0.044*	0.043*	0.035*	0.040**	0.040**
	(0.022)	(0.022)	(0.023)	(0.020)	(0.020)	(0.020)
Distance from Health Facility			-0.001			-0.001
			(0.007)			(0.005)
R2	0.065	0.066	0.066	0.056	0.058	0.058
Observations	8420	8394	8394	11003	10969	10969
Mean Y	0.515	0.515	0.515	0.517	0.517	0.517
Birth Month $\times$ Year FE	Y	Y	Y	Y	Y	Y
Individual Obs	Y	Y	Y	Y	Y	Y
Community Obs	N	Y	Y	N	Y	N
Commid93	Y	Y	Y	Y	Y	Y

# Impacts of The Village Midwife Program on Likelihood of a Male Child at First Birth

	Birth Cohort:1989-99 & 2003-07			Birth Cohort: 1987-2007		
	(1)	(2)	(3)	(4)	(5)	(6)
Treated(=1)	0.053 (0.035)	0.058* (0.035)	0.056 (0.035)	0.036 (0.031)	0.044 (0.031)	0.042 (0.031)
Distance from Health Facility			-0.006 (0.014)			-0.006 (0.009)
R2	0.113	0.114	0.114	0.102	0.104	0.104
Observations	4584	4578	4578	6142	6134	6134
Mean Y	0.512	0.512	0.512	0.514	0.514	0.514
Birth Month $\times$ Year FE	Y	Y	Y	Y	Y	Y
Individual Obs	Y	Y	Y	Y	Y	Y
Community Obs	N	Y	Y	N	Y	N
Commid93	Y	Y	Y	Y	Y	Y

# Impacts on Likelihood of Male Birth, by Mother Education

	Primary and Below			Primary Above		
	(1)	(2)	(3)	(4)	(5)	(6)
Treated(=1)	0.052*	0.052*	0.052*	0.021	0.026	0.024
	(0.031)	(0.031)	(0.031)	(0.037)	(0.038)	(0.038)
Distance from Health Facility			0.000			-0.006
			(0.010)			(0.011)
R2	0.119	0.121	0.121	0.130	0.130	0.131
Observations	4598	4581	4581	3822	3813	3813
Mean Y	0.513	0.513	0.513	0.516	0.517	0.517
Birth Month × Year FE	Y	Y	Y	Y	Y	Y
Individual Obs	Y	Y	Y	Y	Y	Y
Community Obs	N	Y	Y	N	Y	Y
Commid93	Y	Y	Y	Y	Y	Y

# Impacts on Birth Weights (in Grams), by Gender

	<u>Male Birth Weight</u>			<u>Female Birth Weight</u>		
	(1)	(2)	(3)	(4)	(5)	(6)
Treated(=1)	-68.706*	-68.682*	-63.646*	-2.971	-0.446	8.837
	(35.519)	(35.331)	(35.455)	(44.254)	(45.463)	(45.311)
Distance from Health Facility			23.452			33.586*
			(17.040)			(19.006)
R2	0.166	0.168	0.169	0.160	0.164	0.165
Observations	3712	3709	3709	3466	3462	3462
Mean Y	3188.31	3188.43	3188.43	3103.17	3102.80	3102.80
Birth Month FE	Y	Y	Y	Y	Y	Y
Birth Year FE	Y	Y	Y	Y	Y	Y
Individual Obs	Y	Y	Y	Y	Y	Y
Community Obs	N	Y	Y	N	Y	Y
Commid93	Y	Y	Y	Y	Y	Y



# Fertility Selection and Robustness checks

- No evidence
  - Change in total fertility. [Table](#)
  - Change in mother education. [Table](#)
  - Change in mother age at birth. [Table](#)
  - Change in gender specific birth reporting. [Table](#)
- Males are more likely to be born with lower birth weight than females. [Table](#)
- Males are more likely to die an infant than females. [Table](#)
- Years of Exposure generates similar results.

# Discussion

## Implications for

- Calculating mean difference in gender outcomes.
- Maternal health intervention.
- Studies examining *in utero* shocks on later life outcomes.
- Parental response to *in utero* shocks.

# Conclusion

- Maternal health interventions can have unintended effects.
- Implications for human capital formation and policy.

# Fertility Selection: Change in Total Fertility

	<u>Birth Cohort:1989-99 &amp; 2003-07</u>			<u>Birth Cohort: 1987-2007</u>		
	(1)	(2)	(3)	(4)	(5)	(6)
Treated(=1)	-0.052 (0.104)	-0.072 (0.103)	-0.091 (0.103)	-0.052 (0.100)	-0.073 (0.100)	-0.086 (0.100)
R2	0.300	0.303	0.304	0.289	0.291	0.292
Observations	3671	3661	3661	4820	4807	4807
Mean Y	2.50	2.50	2.50	2.52	2.52	2.52
Birth Year FE	Y	Y	Y	Y	Y	Y
Individual Obs	Y	Y	Y	Y	Y	Y
Community Obs	N	N	N	N	N	N
Commid93						

# Fertility Selection: Mother Education

	Birth Cohort:1989-99 & 2003-07			Birth Cohort: 1987-2007		
	(1)	(2)	(3)	(4)	(5)	(6)
Treated(=1)	0.176 (0.122)	0.192 (0.122)	0.185 (0.121)	0.153 (0.119)	0.162 (0.119)	0.161 (0.117)
Distance from Health Facility			-0.016 (0.040)			-0.001 (0.037)
R2	0.454	0.456	0.456	0.438	0.440	0.440
Observations	8420	8394	8394	11003	10969	10969
Mean Y	6.64	6.65	6.65	6.60	6.61	6.61
Birth Month $\times$ Year FE	Y	Y	Y	Y	Y	Y
Individual Obs	Y	Y	Y	Y	Y	Y
Community Obs	N	Y	Y	N	Y	N
Commid93	Y	Y	Y	Y	Y	Y

# Testing for Selection of Mothers: Mother Age at Birth

	(1)	(2)	(3)	(4)	(5)	(6)
Treated(=1)	0.021 (0.031)	0.030 (0.030)	0.028 (0.031)	0.014 (0.031)	0.022 (0.032)	0.026 (0.031)
Distance from Health Facility			-0.006 (0.011)			0.007 (0.015)
R2	0.991	0.991	0.991	0.986	0.986	0.986
Observations	8420	8394	8394	11003	10969	10969
Mean Y	31.17	31.16	31.16	32.23	32.22	32.22
Birth Month × Year FE	Y	Y	Y	Y	Y	Y
Individual Obs	Y	Y	Y	Y	Y	Y
Community Obs	N	Y	Y	N	Y	N
Commid93	Y	Y	Y	Y	Y	Y

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## Birth Weight Reporting by Gender

	(1)	(2)	(3)
Treated(=1)	0.047*	0.042	0.036
	(0.028)	(0.027)	(0.027)
Male Child $\times$ Treated(=1)	-0.001	-0.003	-0.003
	(0.032)	(0.032)	(0.032)
R2	0.448	0.448	0.449
Observations	9460	9437	9437
Mean Y	0.76	0.76	0.76
Birth Month FE	Y	Y	Y
Malec $\times$ Birth Year FE	Y	Y	Y
Individual Obs	Y	Y	Y
Community Obs	N	Y	Y
Malec $\times$ Commid93	Y	Y	Y

# Low Birth Weight

	(1)	(2)	(3)
Years of Exposure	-0.002 (0.002)	-0.003 (0.002)	-0.003 (0.002)
Male Child $\times$ Years of Exposure	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)
R2	0.122	0.124	0.124
Observations	7253	7246	7246
Mean Y	0.08	0.08	0.08
Birth Month FE	Y	Y	Y
Malec $\times$ Birth Year FE	Y	Y	Y
Individual Obs	Y	Y	Y
Community Obs	N	Y	Y
Malec $\times$ Commid93	Y	Y	Y



# Infant Mortality

	(1)	(2)	(3)
Years of Exposure	-0.002*	-0.003*	-0.003*
	(0.001)	(0.001)	(0.001)
Male Child $\times$ Years of Exposure	0.003*	0.003*	0.003*
	(0.001)	(0.001)	(0.001)
R2	0.097	0.098	0.098
Observations	8420	8394	8394
Mean Y	0.03	0.03	0.03
Birth Month FE	Y	Y	Y
Malec $\times$ Birth Year FE	Y	Y	Y
Individual Obs	Y	Y	Y
Community Obs	N	Y	Y
Malec $\times$ Commid93	Y	Y	Y

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