Can Small Incentives Have Large Payoffs?
Health Impacts of a National Conditional Cash Transfer Program in Bolivia

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Outline

Why and What are CCTs?

- Utilization of preventive health services remains low, despite the expansion of free or low-cost maternal and child healthcare in LDCs (Mills, 2014)

- One reason is that there are non-monetary restrictions that prevent households from adopting better practices (Dupas 2011; Galiani & McEwan 2011)
  - Information about program eligibility (Banerjee et al 2015)
  - Cultural barriers to new medicine (Ndyomugyenyi et al. 1998)
  - Time preferences and present bias (Madrian and Shea 2001; Duflo et al. 2011)
  - Herd behavior (Banerjee 1992)

- As a response, many countries have implemented conditional cash transfer (CCT) programs to promote investments in human capital (Fiszbein et al., 2009; Adato and Hoddinott, 2011)
  - CCTs: demand side incentives that consist of monetary payments to households, conditional on compliance with requirements (e.g. medical visits)

Cash or Condition?

- CCTs work through different mechanisms
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- Most CCTs have a short-term goal of reducing monetary poverty
- Payments are often equivalent to 10 to 25% of household income (Fiszbein et al., 2009; Stampini and Tornarolli, 2012)

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- When explaining effects on final health outcomes it is hard to disentangle (M1) from (M2) if payments are large

Research question

Q1 Does the demand for health services increase by paying low monetary incentives ?

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- Policy relevant:
  - If CCTs only worked through the income effect, conditioning cash transfers on "co-responsibilities" would not be necessary (Aizer 2014; Black et al. 2014)
  - If the effects were explained through the signaling channel, payments could be adjusted downwards to a more cost-effective design

- But also theoretically appealing if "nudges" help to overcome fixed costs related to health seeking behavior (e.g, gender and cultural barriers or time inconsistencies)

Paper Overview

- We study the effects of a national conditional cash transfer program in Bolivia, the Bono Juana Azurduy (BJA) on prenatal care and birth outcomes
  - Pays participants an equivalent of 1% of their total consumption (4.7% of per capita exp.) upon compliance with prenatal and postnatal medical visits. Lowest transfer in LAC
  - Pays transfers individually for each eligible health visit completed with the specific amount related to the requirement that is due, as opposed to flat bi-monthly payments on an ongoing basis

- Different quasi-experimental methods and data show the BJA's success:

  1 **IV** + **Fixed Effects** using Municipality level data and Census data:

  → BJA reduced the rate of stillbirths in 38.8% in rural municipalities with average enrolment rates with respect to pre-program average

  → Survival rates are 18.2% higher for cohorts exposed to the program in their prenatal stage

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  2 **Sibling fixed effects** using household level data:

  → Higher rates of utilization of prenatal care services and skilled birth attendance

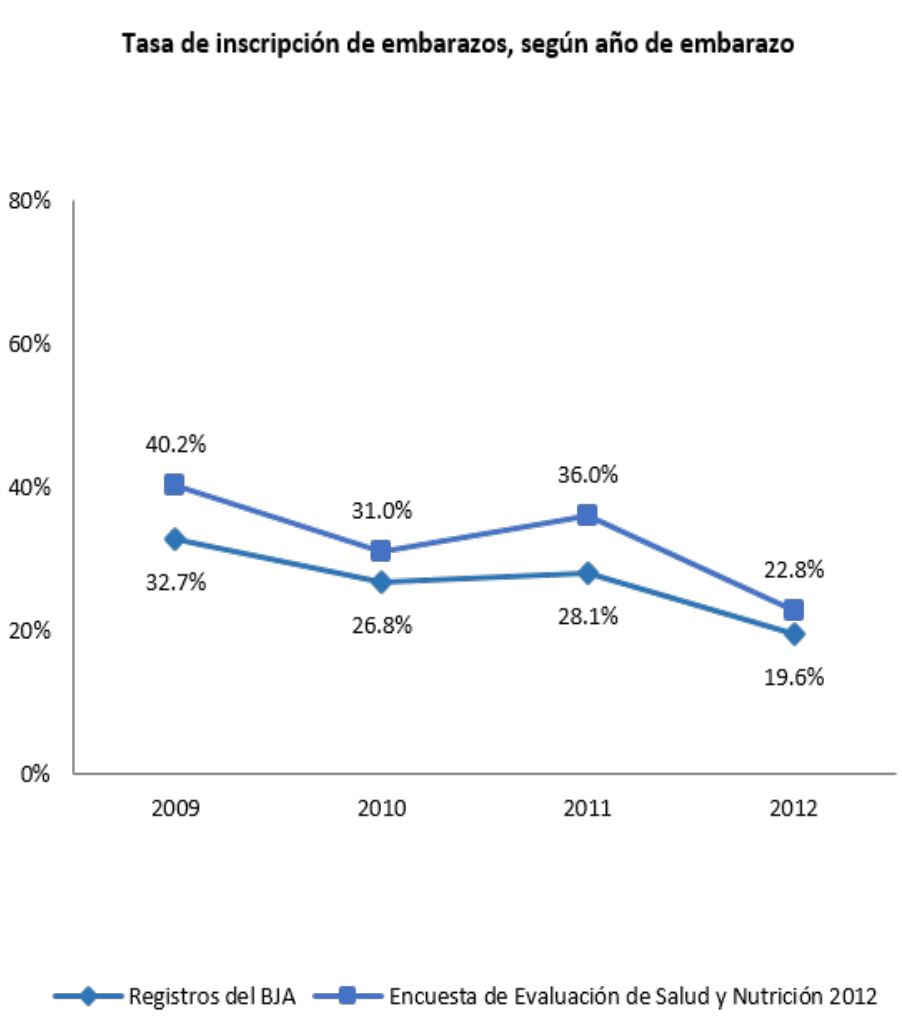
The BJA Program

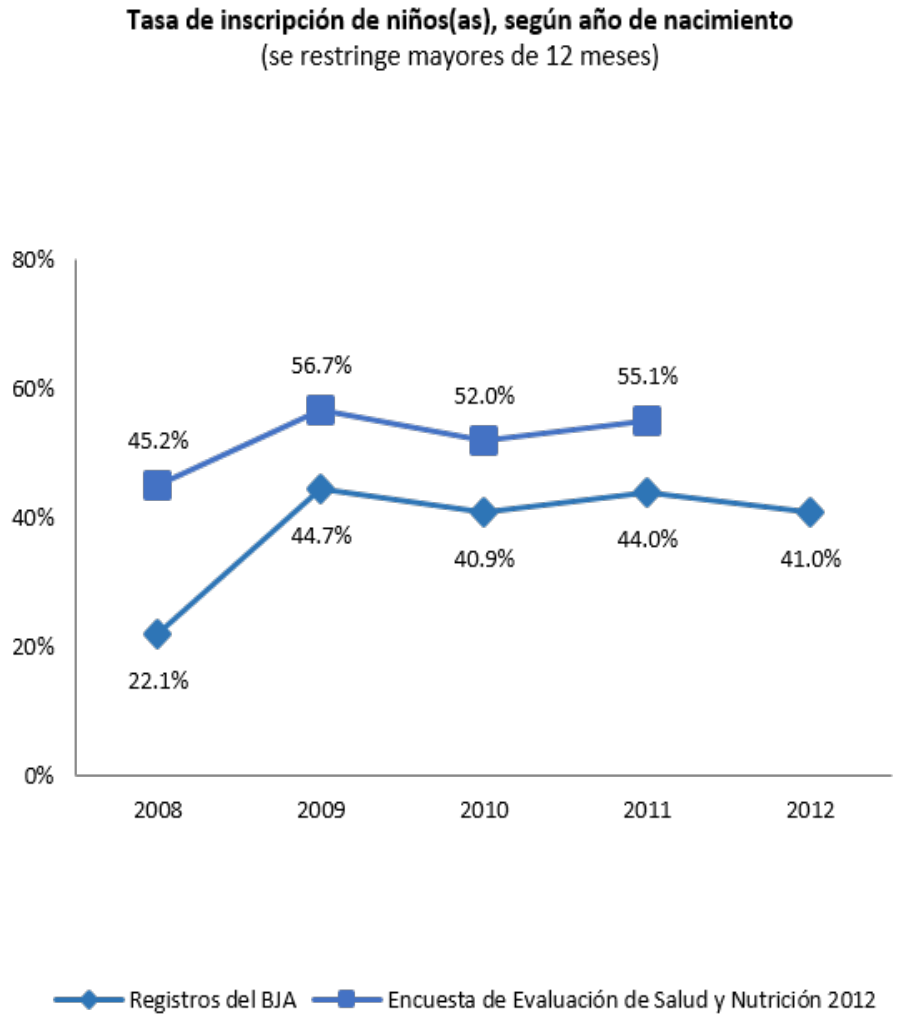
- Implemented in May 2009 at a national scale: 399,012 women y and 574,745 children (2009-2013)
- Eligibility criteria:
  - For pregnant women: No insurance (public or private)
  - For children: No insurance and be less than 12 months at the moment of enrollment
- CCT for health services with the goal of:
  - Increasing utilization of health services, birth attendance by skilled personnel, and reducing infant mortality and malnutrition
- National protocols of routine check-ups (MINSAL 2011):
  a) registration of basic information in the prenatal history form,
  b) capture of vital signs (blood pressure, heart rate, breathing rate, body temperatures),
  c) measurement of BMI,
  d) evaluation and assessment of the pregnancy risk level (high, medium or low),
  e) implementation of a health promotion and prevention package.

BJA-Payment structure

Conditionalities	Number	Amount (USD)	Max. (USD)
Women			
Pre natal controls	4	7	28
Skilled birth delivery and follow-up	1	17	17
Children			
Growth monitoring check-ups for children $\leq$ 24 months	12	18	216
Complete program (33 months)			261

BJA - Take up


Tasa de inscripción de embarazos, según año de embarazo
80%
60%
40%
20%
0%
40.2%
31.0%
36.0%
22.8%
32.7%
26.8%
28.1%
19.6%
2009
2010
2011
2012
Registros del BJA
Encuesta de Evaluación de Salud y Nutrición 2012


Tasa de inscripción de niños(as), según año de nacimiento
(se restringe mayores de 12 meses)
80%
60%
40%
20%
0%
56.7%
52.0%
55.1%
45.2%
44.7%
40.9%
44.0%
41.0%
22.1%
2008
2009
2010
2011
2012
Registros del BJA
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Take-up rates

- Main reasons for low enrollment rates:
  - Lack of information about the program's enrollment procedures (27.5%)
  - Not having the required legal documents at the moment of enrollment (19.9%)
  - Time costs associated to long queues or long trips to health facilities and payment centers (20.3%).
- Payment centers:
  - The program relied entirely on payment centers to manage payments of the cash transfers.
  - Managed by local bank branches (urban), Armed Forces or travel to nearest municipality (rural)
  - Large heterogeneity on coverage of financial payment centers which are of better quality (infrastructure and effectiveness).
  - Delays of up to 3 months in payments to enrollees.

Payment centers

Table: Expansion of financial payment centers over time

Year	Municipalities with at least one payment center	Payment centers per 1,000 enrolled women		
	Perc.	Mean	Std. Dev.	Median
2009	26.48%	9.98	22.05	5.44
2010	33.96%	19.79	56.71	9.68
2011	34.89%	13.47	21.15	8.62
2012	34.89%	16.82	26.06	11.06

Notes: Source: Author's own calculation based on SNIS and administrative records of the BJA program. The average of payment centers per women enrolled is computed amongst municipalities with at least one payment center available.

Main outcome: Stillbirths

- 2.6 million stillbirths occur annually (de Bernis et al. 2016).
  - Stillbirth refers to a dead born fetus that dies at or after the 28th pregnancy week
  - Sizable number compared to the 4.5 million of infants who die before the first year of life (see WHO, 2013)

- Possible mechanisms to reduce stillbirths (The Lancet Series on Stillbirths 2011):
  - Causes: Adolescent pregnancies; maternal infections during pregnancies (syphillis and malaria), non-communicable diseases, nutrition, among other lifestyle factors
  - Early initiation of prenatal care improve early detection of infections and is linked to better health outcomes
  - Carroli et al., 2001b; Campbell and Graham, 2006; Rosenzweig and Schultz 1983; Grossman and Joyce 1988; Evans and Stech-Lien 2005

Data and Measurement

- National Health Information System (SNIS by its Spanish acronym)
  - Registry of information on different indicators of health services provision and outcomes to which local health facilities must report.
  - The information is interactively available on the Ministry of Health website
  - For birth information to find its way into the system, the birth must have been attended by a doctor, nurse or other qualified health professional at a health facility or at home
  - For every birth in the data we observe whether the outcome is a born or dead fetus
- Outcome: Number of stillbirths (numerator) per 1,000 live births (denominator) in each municipality for each year between 2005 and 2012
- Municipality enrolment rates are obtained from administrative records from BJA and projections of eligible women by the National Institute of Statistics
- Administrative records also have the number of financial payment centers in each municipality and year

Methods

- We estimate the following regression:

$$Y_{j,t} = \phi_t + \phi_j + \delta_1 Av.Enroll_{j,t,t-1} + X'_{j,t}\gamma + \varepsilon_{j,t} \quad (1)$$

  - Where, $Y_{j,t}$ is the rate of stillbirths for municipality j in year t and year $t-1$;
  - $Av.Enroll_{j,t,t-1}$ is the average enrollment rate for municipality j in year t and year $t-1$.
  - Include lagged value because women that gave birth in the first months of a given year were exposed to the program during the previous year for an important period of their pregnancy.
  - $X_{j,t}$ vector of control characteristics for municipality j at year t;
  - $\phi_t, \phi_j, \varepsilon_{j,t}$ are municipality fixed effects, time fixed effects, and unobservable characteristics that vary across municipalities and time, respectively.

- Need strong assumptions to estimate δ_1 through OLS
  - Estimating (1) through OLS would lead to a biased estimate of the effect of the program on the rate of stillbirths.
  - Municipalities may have enrolled at a higher rate because they were expecting stillbirths to rise in the next years.

Graphical Inspection

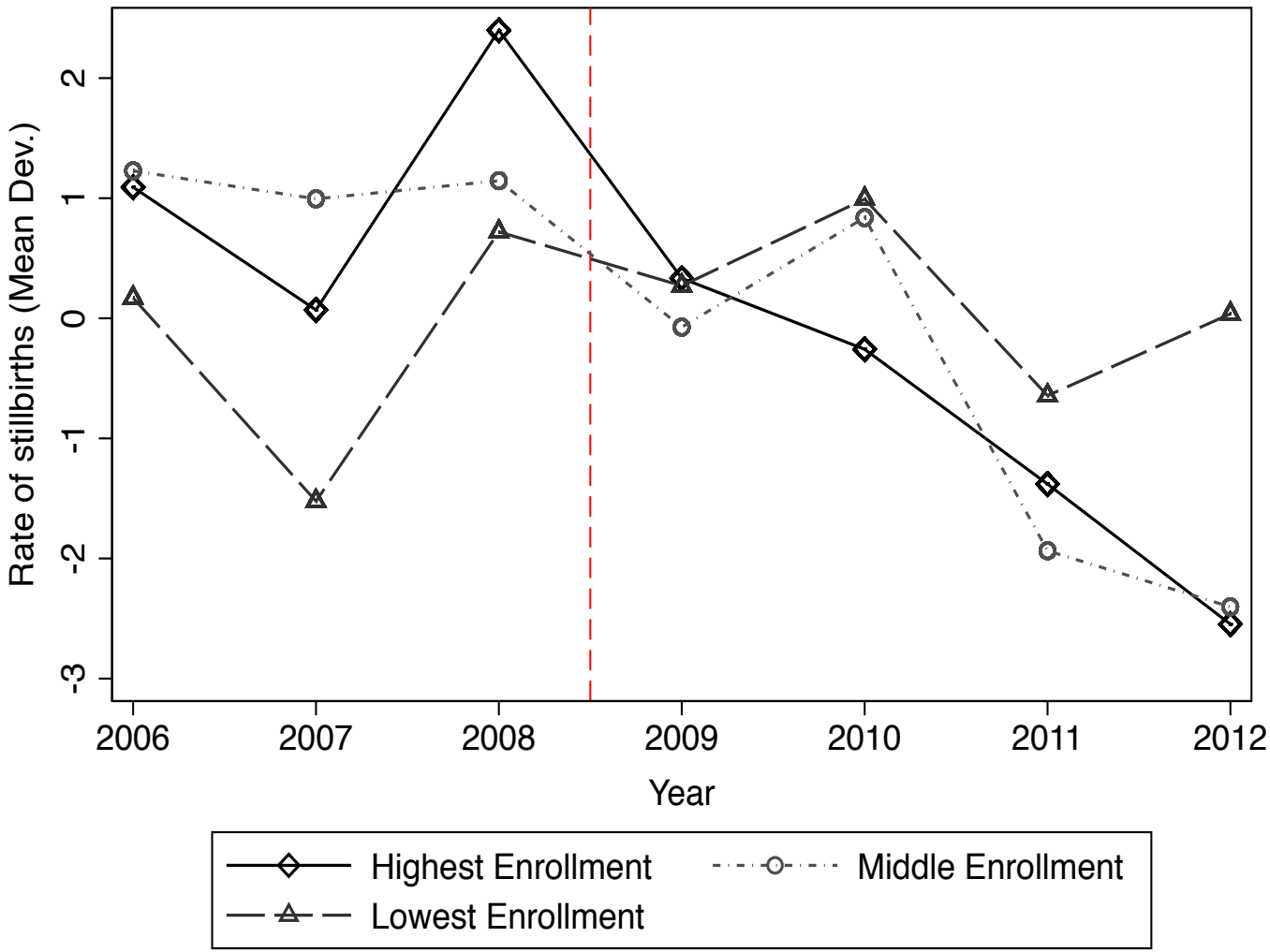

Figure: Trends in the rate of stillbirths for municipalities with enrollment rates above the median (High) and below the median (Low) enrollment rate in year 2009

Methods

- We use the change in financial payment centers over time as an instrumental variable for the enrollment rate in (1).
- There are significant changes in the number of municipalities with a financial entitity available, and the population covered by payment centers also varies
- Whether beneficiaries had a financial payment center available at the start of the program was not determined by the BJA but rather by the installed capacity of banks in the municipalities.
- Exclusion restriction in changes. We explore whether changes in payment centers are related to the pre-trends in stillbirths

$$Y_{j,t} = \alpha + \sum_{t=2006}^{2008} \beta_t Year_t + \sum_{t=2006}^{2008} \gamma_t Year_t \Delta Ln(P.C.)_{j,2009} + \phi_j + \mu_{j,t} \quad (2)$$

Results

Table: Effect of BJA Intensity on the Rate of Stillbirths at the Municipality Level

	(1) Pre-trends and IV	(2) OLS	(3) Reduced Form	(4) 1st Stage	(5) 2SLS
Av. Enrollment$_{t,t-1}$					
Ln(payment centers)					
Δ Ln(P.C.) in 2009 × year 2006	0.056				
	(0.367)				
Δ Ln(P.C.) in 2009 × year 2007	0.305				
	(0.553)				
Δ Ln(P.C.) in 2009 × year 2008	0.366				
	(1.000)				
Observations	1,284				
Adjusted R^2	0.004				
Joint F-test γs	0.108				
Joint p-value γs	0.955				
1^{st} Stage F-test					
1^{st} Stage p-value					
Average enrollment rate			0.32		
Baseline mean of stillbirths			21.8		

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	(1) Pre-trends and IV	(2) OLS	(3) Reduced Form	(4) 1st Stage	(5) 2SLS
Av. Enrollment$_{t,t-1}$		-8.109**			
		(3.818)			
Ln(payment centers)					
Δ Ln(P.C.) in 2009 x year 2006	0.056				
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Δ Ln(P.C.) in 2009 x year 2007	0.305				
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Δ Ln(P.C.) in 2009 x year 2008	0.366				
	(1.000)				
Observations	1,284	2,568			
Adjusted R^2	0.004	0.246			
Joint F-test γs	0.108				
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	(1) Pre-trends and IV	(2) OLS	(3) Reduced Form	(4) 1st Stage	(5) 2SLS
Av. Enrollment$_{t,t-1}$		-8.109**			-26.453**
		(3.818)			(12.043)
Ln(payment centers)			-0.834**	0.032***	
			(0.383)	(0.002)	
Δ Ln(P.C.) in 2009 x year 2006	0.056				
	(0.367)				
Δ Ln(P.C.) in 2009 x year 2007	0.305				
	(0.553)				
Δ Ln(P.C.) in 2009 x year 2008	0.366				
	(1.000)				
Observations	1,284	2,568	2,568	2,568	2,568
Adjusted R^2	0.004	0.246	0.246	0.858	0.238
Joint F-test γs	0.108				
Joint p-value γs	0.955				
1^{st} Stage F-test				40.06	
1^{st} Stage p-value				0.000	
Average enrollment rate			0.32		
Baseline mean of stillbirths			21.8		

Results

Table: Robustness Checks for the Effect of the BJA on the Rate of Stillbirths

	(1) 2SLS IV: Number	(2) 2SLS Drop zeros	(3) 2SLS Drop Y2005	(4) 2SLS Drop Y2008	(5) 2SLS IV: Alt.	(6) OLS-FE Light/capita
Avg. Enrollment t, t-1	-28.719**	-33.190**	-23.856**	-29.906**	-30.235**	
	(13.750)	(12.915)	(11.668)	(13.283)	(13.596)	
Ln(payment centers)						0.0003
						(0.001)
Observations	2,568	1,691	2,247	2,247	2,568	2,560
Adjusted R^2	0.236	0.505	0.233	0.256	0.332	0.8793

Notes: Notes: Standard errors in parenthesis clustered at the municipality level. (1): Principal IV regression of (1) but changing the instrument to be the number of payment centers available in the municipality in a year. The number of payment centers is top-coded at six payment centers. (2): Principal IV regression of (1) model excluding observations that reported 0 stillbirths. (3): Principal IV regression of (1) model excluding year 2005. (4): Principal IV regression of (1) model excluding year 2008. (5): Principal IV regression of changing instrument to initial capacity multiplied by expansion in the rest of the country. (6): Fixed effects regression using as dependent variable logarithm of luminosity per capita. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Interpretation

- The results show that the rate of stillbirths on a municipality with average enrollment rates decreased in 38.8% with respect to baseline averages
- Age Cohort exposed to the program in the prenatal stage grew in 18.2% in municipalities with average enrollment rates (Not shown today)
- Large 2SLS effects are consistent with:
  - Direction of bias in OLS due to enrollment rates based on expectations of future growth rate of stillbirths
  - Measurement error in treatment intensity: anti-attenuation bias in 2SLS
- Are these effects consistent with higher take-up rates of prenatal care?

Data

- Encuesta Evaluación de Salud y Nutrición 2012. Household survey implemented between April and December de 2012. Retrospective data.
- National representation. 8,433 households, 12,088 pregnancy histories, and 11,358 children.
- Content:
  - Basic socio demographics.
  - Pregnancy histories for the last 5 years.
  - Program participation module.
  - Maternal care and nutrition.
  - Infant health.
  - Anthropometric measures, bio markers (anemia), and early child development (ASQ test).

Method

- Mother/Siblings fixed effects:

$$y_{ij} = \alpha + \phi_t + \phi_j + \delta D_{ij} + X'_{ij}\gamma + \mu_{ij} \tag{3}$$

  - Where y_{ij} is the outcome variable for pregnancy i for mother j;
  - ϕ_t, ϕ_j are unobservable fixed effects for time and particular to the pregnancy/child (or the "event") of mother j;
  - D_{ij} is the treatment status;
  - X_{ij} are pregnancy specific observables;
  - μ_{ij} is are pregnancy specific unobservables.

- We restrict our sample to mothers that have more than two pregnancies and at least one pregnancy is not eligible, i.e. terminated before the BJA started.
  - Variation in the treatment status for the same mother is due mostly to exogenous program eligibility rules
  - Potential confounders are: mothers' parenting skills and unobserved risk
  - We include controls in flexible forms for order of birth, age of the mother at delivery, sex of the child and cohort of birth

Method

Table: Impact Evaluation Indicators using ESNUT 2012

Indicator	Definition
Maternal and neonatal health Indicators	
Coverage of early antenatal care	Probability of having the first antenatal care checkup before week 20 of pregnancy
Coverage of antenatal care (at least 4 visits)	Probability of having at least four antenatal care checkups by skilled health personnel (doctor, nurse or auxiliary nurse)
Coverage of skilled birth attendance and postpartum care	Probability of having a birth attended by skilled health personnel and receiving a postpartum checkup in the first 7 days after birth

Table: Effect of BJA Enrollment on Utilization of Prenatal Care Services

	All Sample		Urban Households		Rural Households	
	(1)	(2)	(3)	(4)	(5)	(6)
A. Weeks Pregnant At First Prenatal Check-up						
Treatment effect	-2.558***	-2.311***	-2.113**	-1.759**	-2.931***	-2.731***
	(0.542)	(0.546)	(0.816)	(0.848)	(0.716)	(0.687)
Control group mean	13.65		11.92		15.95	
B. Probability that First Visit Occurs Before the 20th Week if Pregnancy						
Treatment effect	0.086***	0.080***	0.064	0.056	0.106***	0.101***
	(0.031)	(0.030)	(0.048)	(0.049)	(0.035)	(0.034)
Control group mean	0.746		0.792		0.687	
C. Probability of at Least Four Prenatal Check-ups						
Treatment effect	0.117***	0.103***	0.128**	0.110**	0.110***	0.097***
	(0.028)	(0.028)	(0.049)	(0.047)	(0.026)	(0.025)
Control group mean	0.739		0.807		0.648	
D. Probability of Skilled Birth Attendance and First Postpartum Checkup						
Treatment effect	0.024	0.024	0.000	0.009	0.054**	0.050**
	(0.026)	(0.026)	(0.044)	(0.045)	(0.022)	(0.022)
Control group mean	0.439		0.506		0.351	
Observations	5,505	5,505	1,084	1,084	4,421	4,421
Mother fixed effects	Y	Y	Y	Y	Y	Y
Controls for covariates	N	Y	N	Y	N	Y

Final remarks

- We show that small incentives, i.e. 1% of a household's total consumption,
  - Effectively stimulated the demand for prenatal services, skilled birth attendance and postpartum care.
  - Reduced the level of stillbirths by approximately 38.8% with respect to baseline averages.

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  - Reduced the level of stillbirths by approximately 38.8% with respect to baseline averages.
- Our cost-effectiveness analysis shows that overall the BJA had a cost of $272.57 USD per DALY averted, making the intervention highly cost-effective according to WHO standards
- Most CCTs consist in large transfers relative to household income, making it difficult to separate effects derived from increased utilization of health services from a direct effect of income.
- The evidence here suggests that directed and relatively small monetary incentives can be a cost-effective policy alternative for reducing behavioral barriers for health services which can have positive effects on final health outcomes.

Thank you