

Mexico's conditional cash transfer programme increases cesarean section rates among the rural poor

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Background: Caesarean section rates are increasing in Mexico and Latin America. This study evaluates the impact of a large-scale, conditional cash transfer programme in Mexico on caesarean section rates. The programme provides cash transfers to participating low income, rural households in Mexico conditional on accepting health care and nutrition supplements. **Methods:** The primary analyses uses retrospective reports from 979 women in poor rural communities participating in an effectiveness study and randomly assigned to incorporation into the programme in 1998 or 1999 across seven Mexican states. Using multivariate and instrumental variable analyses, we estimate the impact of the programme on caesarean sections and predict the adjusted mean rates by clinical setting. Programme participation is measured by beneficiary status, programme months and cash transfers. **Results:** More than two-thirds of poor rural women delivered in a health facility. Beneficiary status is associated with a 5.1 percentage point increase in caesarean rates; this impact increases to 7.5 percentage points for beneficiaries enrolled in the programme for ≥ 6 months before delivery. Beneficiaries had significantly higher caesarean delivery rates in social security facilities (24.0 compared with 5.6% among non-beneficiaries) and in other government facilities (19.3 compared with 9.5%). **Conclusion:** The *Oportunidades* conditional cash transfer programme is associated with higher caesarean section rates in social security and government health facilities. This effect appears to be driven by the increases in disposable income from the cash transfer. These findings are relevant to other countries implementing conditional cash transfer programmes and health care requirements.

Keywords: poverty, social welfare, public policy, health care delivery, caesarean section.

Introduction

Since the 1970s, caesarean section (CS) rates have risen rapidly in many parts of the world.^{1,2} The median rate of CS in Latin America is estimated at 33%.³ Among women delivering in private facilities in Brazil, rates as high as 82% have been reported.⁴ Increasing access to essential technologies for safe delivery is central to preventing maternal mortality. However, these rates far exceed the medically justified estimate of 15%.⁵

High rates of CS are primarily related to non-medical indications. These include changes in the behaviour of health professionals, such as higher insurance reimbursements for caesarean vs. vaginal delivery,⁶ defensive medicine,⁷ and convenience.⁸ From the demand side, women with the financial means have increasingly elected to undergo CS because it is perceived as safe and convenient.⁹ However, high rates of CS correspond with increased preterm delivery and neonatal mortality,^{3,10} and maternal and neonatal morbidities.¹¹

In 1997, Mexico introduced a large-scale conditional cash transfer programme (CCT) that aims, in part, to improve birth outcomes through better maternal nutrition and use of prenatal care. The programme (originally called PROGRESA and now *Oportunidades*) uses cash transfers as incentives for parents to invest in their children's health and education so that they obtain the capabilities necessary to escape poverty when they reach adulthood.¹² To improve reproductive

health outcomes, *Oportunidades'* cash transfers to beneficiary households are conditioned, in part, on pregnant women completing a prescribed prenatal care plan, obtaining nutritional supplements and attending an educational programme about health and nutritional topics. Across diverse settings, CCTs have been successful in increasing the use of health services as well as improving child health outcomes.¹³ Mexico's *Oportunidades* is the oldest and largest CCT programme, which has demonstrated significant reductions in child morbidity, mortality, anaemia and low-birth weight among its beneficiaries.^{14–19} The programme also resulted in better quality health care received, which was attributed to encouraging more active and informed consumers.²⁰

Evaluations of *Oportunidades* have reported about the effect of increased income among beneficiary households on the demand for goods and services. Participating households consume on average 75 cents of every peso from the transfer programme, which leaves increased disposable income for investments.²¹ Beneficiary households have used the additional financial resources for purchasing supplementary and more nutritious calories.²² Increases in the cash transfer are associated with improved child growth, possibly attributable to investments in food, household sanitation or health care.²³ However, the cash transfer component is also associated with poor health outcomes; doubling the cumulative cash received predicts higher rates of adult obesity and blood pressure.²⁴ Other studies have suggested that the cash transfer could increase smoking. This is because tobacco is a normal good in Mexico; therefore, increases in income are associated with increases in tobacco consumption.²⁵

We hypothesize that the *Oportunidades* programme affected delivery outcomes for several reasons. First, even though skilled delivery attendance was not a programme requirement, low-income rural women were required to use the formal

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health system for primary care. This introduced many women to a broad range of reproductive and other health services available in the public system. Second, delivery outcomes such as CS are closely linked with non-medical indications, including changes in household wealth. Increases in disposable income among participating households could have modified health-seeking behaviour related to delivery outcomes. In this article, we evaluate whether the *Oportunidades* programme had an impact on the rates of CS.

Methods

The programme

In 1997, Mexico's conditional cash transfer programme was designed to break the inter-generational transmission of poverty by providing incentives for parents to invest in the human capital of children. Cash transfers are conditional on family members obtaining health and education services.^{14–19} Programme beneficiaries were phased in based on the availability of federal resources, which allowed for an ethical evaluation of programme effectiveness. Coverage expanded from 300 000 rural families in 1997 to ~5 million low-income families in both rural and urban areas by 2007.^{26,27}

The rural programme established eligibility in two stages: poor communities were first identified and low-income households were identified within those communities.²⁸ Poor communities were selected using a marginalization index constructed from census data measuring literacy, household infrastructure and employment. Within poor communities, a socio-economic survey was conducted to construct a proxy means test using data about socio-economic characteristics, occupation, income and disability, and access to health services. On average, 78% of the households in selected communities were classified as eligible for programme benefits, and 97% of eligible households with young children enrolled in the programme. Once enrolled, the households received benefits for 3 years conditional on meeting programme requirements. To prevent migration into treatment communities, new households were unable to enrol until the next certification period.

Participating households receive cash transfers for health and education. The monthly health stipend is fixed at ~US\$15/household/month.²⁹ It is conditional on each family member obtaining regular clinic consultations and attending *pláticas* (health education talks). *Oportunidades* required that households prove compliance via certification at public clinics and schools.³⁰ The education transfer is based on school grade and sex. The maximum monthly benefit cap for health and education together equals ~US\$ 90 and 160 for families with primary and high school children, respectively.³¹ Total transfers for health and education average 17–20% of pre-programme rural per capita household consumption.²¹ Non-compliance was negligible; only 1% of households were denied the cash transfer due to non-compliance.¹⁵

The *Oportunidades* health requirements vary by age. For pregnant women, five prenatal visits are required, with an emphasis on monitoring the pregnancy's progression, and the prevention, detection and control of obstetric and perinatal risk factors. Specifically, pregnant women are required to attend monthly *pláticas*, which emphasize preventive care, prenatal care consultations, nutrition and other health information.

Experimental design

The government commissioned an independent evaluation of programme impact. Planned as a randomized evaluation, it

was based on a sample of 506 treatment communities, randomly selected using probabilities proportionate to the size of 6400 communities.³² Of the 506 experimental communities, 306 were randomly assigned to the treatment group, scheduled to receive benefits starting in April 1998, and the remaining to the control group, which started to receive benefits in December of 1999. Participants were unaware about the timing of programme roll-out.

These analyses focus on delivery outcomes. We use information from the fertility module about the date of birth, and from administrative records about the date of the first cash transfer received. Beneficiary births are those births that occurred after the household received their first cash transfer. Non-beneficiary births are those that occurred among eligible women prior to receiving the first cash transfer.

Sample and data

A fertility survey was fielded in 2003 to evaluate the programme's impact on reproductive outcomes, using a subset of the original treatment and control communities.³³ The survey used a two-stage stratified sampling design. Communities and households were randomly selected based on a probability sample proportionate to the number of women of reproductive age (15–49 years). All eligible women were interviewed in selected households. Written consent for participation was obtained from the mother or household head. The project was approved by the Human Subjects and Ethics Committee of the National Institute of Public Health, Mexico. Among women identified for survey completion, 84% fully completed interviews. The most common reason cited for incompleteness was not at home (5.1%) and 1.8% refused to be interviewed. The sample for these analyses includes women who experienced a singleton live birth between 1997 and 2003, were designated as poor and eligible for *Oportunidades*, lived in the original treatment and control communities, and reported about their delivery outcomes. With these limitations, the main analyses include 979 women.

The key dependent variable is CS reported by the mother. Secondary dependent variables are delivery location, defined as delivery in any public facility (operated by the social security administration, Ministry of Health or another government department), and delivery in any health facility (public or private).

From the fertility module, information was collected about maternal characteristics and birth histories, including maternal age, the number of prior pregnancies and prior miscarriage or abortion. Household and community socio-economic and demographic baseline characteristics were collected from the 1997 census prior to the intervention. From census data, information included educational level and age of the head of household, maternal educational levels, indigenous speaking households, the number of large household assets (ownership of land, home ownership, refrigerator, gas heater, television, internal water in household and electricity in household) and distance from the community to the capital city.

Analysis

Our primary analyses estimate programme impact on CS. We also analyse programme impact on delivery location and estimate the adjusted mean CS rates by clinical setting. We use multivariate statistical methods that control for individual, household and community covariates to reduce idiosyncratic variation and improve the power of the estimates. The dependent variables were analysed using community random

effects multivariate linear regression. Random effects take into account intracluster correlation that may exist because the interventions were randomized at the community level.

The main analyses report programme impact using three different programme participation measurements. Overall programme impact is represented by a variable identifying a beneficiary birth, defined as births that occurred after the household received their first cash transfer. Programme treatment intensity is defined as the number of months between the date of receiving the first cash transfer and the date of birth. Both variables are unlikely to be correlated with household behaviours because the date of incorporation into the programme was randomly assigned. In addition, a previous study found no relationships between the programme and fertility decisions.³⁴

We, then, identify the importance of the cumulative cash transfer. Actual cash transfers are based, in part, on the households' decisions to send their children to school and compliance with programme requirements; therefore, these benefits were not allocated randomly and represent a source of bias. Instrumental variable analysis is a commonly used econometric method to remove the effects of these hidden biases.³⁵⁻³⁷ We generated an instrument that operates through transfers received but is unlikely to be correlated with other behaviours of the household. The instrument used is potential monthly cash transfers per capita. Potential transfers are estimated by applying the programme rules to the household's pre-intervention demographic composition and children's school enrolment, assuming no school drop-outs or grade repetition. The instrumental variable analysis is similar to the intent to treat analyses for randomized controlled trials because it assumes the absence of alternative pathways and effect modification. Potential cash transfers are used as an instrument for actual cash transfers in a two-stage least-squares regression. To estimate programme impact for intensity and cash transfers, the coefficients are multiplied by the average number of months on the programme and the average cash transfer received by beneficiaries, respectively.

The adjusted means for CS are estimated for the three main clinical settings: social security facilities, government health facilities and private clinics. Adjusted means are generated using community-fixed effects multivariate regressions. These models predict the rates of CS while holding constant at their mean values the individual, household and community

characteristics. The adjusted regression models include independent variables that are significant predictors of CS. They include maternal age, number of prior pregnancies, prior miscarriage or abortion, educational level of the household head of the mother, age of the household head, whether the household was indigenous-speaking, a household large assets index, and distance to the capital city. The large household asset index was generated by summing up the individual items and expressing assets as a proportion of the total. The tables report the overall programme impact. Statistical analyses were done using STATA (release Stata 9.2, Stata Corp, College Station, TX, USA). Statistical significance was declared at conventional levels.

Results

Table 1 compares maternal and household characteristics between non-beneficiary and beneficiary births. A total of 203 non-beneficiary and 776 beneficiary births were studied. The sampling strategy resulted in a moderately well-balanced sample. Several significant differences exist but the bias is unclear. Beneficiaries have significantly fewer pregnancies, are from households with slightly younger heads, and a higher percent are indigenous. There are no significant differences between the two groups for delivery location. On average, just over two-thirds of women delivered in any health facility.

Table 2 presents programme impact on CS from a series of unadjusted and adjusted models. The results are similar, and we describe the adjusted models that include independent variables to reduce residual variance. Beneficiary status is associated with a 5.1 percentage point increase in CS (Model 1, $P=0.05$). Being a beneficiary for ≥ 6 months before delivery is associated with a 7.5 percentage point increase in CS. Replacing the beneficiary variable with programme months, the impact on CS from cumulative programme exposure is 4.5 percentage points (Model 3, $P<0.01$). Using only the cash transfer as a measure of programme participation in an instrumental variable model, cumulative cash received is associated with an increase in CS of 3.7 percentage points (Model 4, $P<0.01$). Independent variables significant at the 5% level include household wealth, age of the household head, maternal education and complications during pregnancy.

Table 1 Comparison of sample characteristics for non-beneficiary and beneficiary births

Maternal, household and community characteristics	Mean (SD) ^a			P-value
	Non-beneficiaries	Beneficiaries	Difference	
Maternal age (years)	29.78 (6.30)	29.24 (6.74)	-0.54	0.29
Total prior pregnancies	5.25 (2.55)	4.63 (2.60)	-0.62	<0.01
Prior miscarriage or abortion (%)	6.90	6.19	-0.71	0.71
Household socioeconomic index (0-1)	0.42 (0.18)	0.40 (0.17)	-0.02	0.21
Indigenous-speaking household (%)	29.56	38.27;	8.71	0.02
Educational level of household head (years)	3.56 (2.66)	3.47 (2.58)	-0.09	0.66
Age of household head (years)	41.58 (8.76)	40.14 (9.99)	-1.44	0.05
Maternal educational level (years)	3.93 (2.59)	3.96 (2.77)	0.03	0.88
Distance to urban center (km)	109.67 (43.41)	111.49 (43.18)	1.82	0.59
Delivery characteristics				
Delivery location (%)				0.82
Social security facility	12.32	11.47	-0.85	
Other government facility	39.41	40.08	0.67	
Private clinic	12.32	10.31	-2.01	
Other locations	35.96	38.14	2.18	
Number of observations	203	776		

a: Unless otherwise indicated

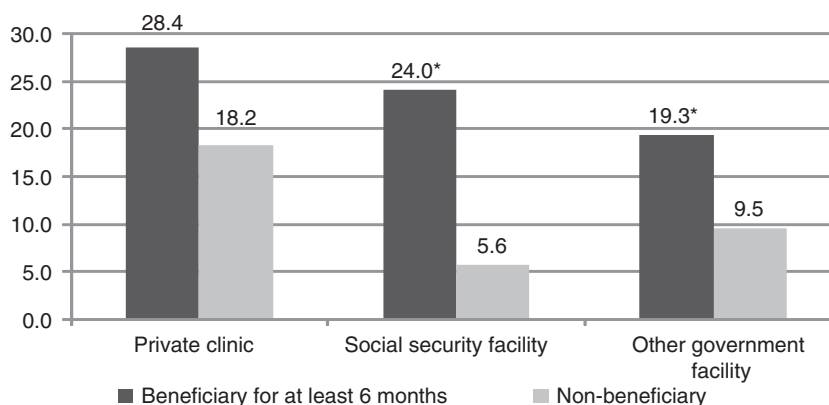
Table 2 Unadjusted and adjusted models predicting programme impact on caesarean section

Model	Programme participation variable	Percentage point increase in caesarean section rates			
		Unadjusted models (%)	P-value	Adjusted models (%)	P-value
1	Beneficiary at birth	4.91	0.06	5.08	0.05
2	Beneficiary for 6 months	7.37	<0.01	7.52	<0.01
3	Average months of programme exposure	4.49	<0.01	4.48	<0.01
4	Average cumulative cash transfer	3.98	<0.01	3.72	<0.01
5	Average cumulative cash transfer controlling for beneficiary status ^a	3.80	0.01	3.36	0.03
6	Average months of programme exposure controlling for beneficiary status ^a	4.11	0.05	3.96	0.06
7	Average cumulative cash transfer controlling for programme months ^b	4.35	0.03	3.91	0.07

Adjusted models include maternal and household variables listed in table 1. Impact for programme exposure and cash estimated using average time on programme in months and average cash transfer received by beneficiaries

a: Beneficiary status variable not significant

b: Programme months not significant

**Figure 1** Adjusted means for c-section, by delivery location and beneficiary status. Figures adjusted for variables in table 1.

*Difference between beneficiary and non-beneficiary status significant at <0.01

We, then, evaluate the relative importance of programme exposure and the cash transfer on CS. Including the beneficiary dummy as a control variable, the cumulative cash transfer is associated with a 3.7 percentage point increase in CS (Model 5, $P=0.03$). Model 6 replaces the cash transfer variable with programme months; programme impact amounts to 4.0 percentage points in the adjusted model ($P=0.06$). Including both programme months and cash transfers in Model 7, the length of time on the programme is no longer significant in adjusted models. The cumulative cash transfer predicts an impact of 4.4 and 3.9 percentage points in unadjusted and adjusted models, respectively ($P=0.03$, $P=0.07$).

Beneficiary status does not significantly predict delivery location (not shown). The average rate of CS among beneficiary women participating in the programme for ≥ 6 months was 14.5% when compared with 7.1% among non-beneficiaries. Figure 1 presents the adjusted means for CS by delivery location for programme beneficiaries of ≥ 6 months compared with non-beneficiaries. As expected, the highest rates of CS are in private clinics. However, there is no significant difference between beneficiaries and non-beneficiaries in private clinical settings. Significant differences between the two groups are evident in public clinical settings ($P<0.01$). Some 24% of beneficiaries (95% CI: 16.4–31.6) underwent CS in social security facilities compared with 5.6% of non-beneficiaries. Among beneficiaries that delivered in Ministry of Health or other government facilities, 19.3% underwent CS (95% CI: 15.5–23.1) compared with 9.5% among non-beneficiaries.

Discussion

This study uses retrospective reports from poor rural women who participated in a randomized effectiveness trial to examine the impact of Mexico's conditional cash transfer programme on delivery outcomes. Programme impact amounts to a 5.1 percentage point increase in CS among beneficiaries; this impact increases to 7.5 percentage points for women on the programme for ≥ 6 months. Beneficiaries had higher CS rates in social security facilities (24.0 compared with 5.6% among non-beneficiaries) and in other government facilities (19.3 compared with 9.5%).

There could be several explanations for higher rates of CS among beneficiaries, including medical indications, increased demand for CS or financial incentives for physicians. First, the average rate of CS among beneficiary women participating in the programme for ≥ 6 months was 14.5%. This is in line with estimates of 15% based on medical justification. Therefore the programme probably increased access to obstetric services and technology for women in need. However, this figure is based on the sample as a whole and does not explain variations by delivery location.

Second, our previous research documented an empowerment effect—in that *Oportunidades* beneficiaries demanded quality health care and higher quality is associated with improved birth outcomes.³⁸ Upper-income women in Mexico have increasingly elected to undergo CS because it is perceived as safe and convenient. It is possible, therefore, that the increase in CS could be attributed in part to increased

demand. If this were the case, however, we would have expected to see higher rates across both public and private clinical settings. Increased demand among women does not explain why significant differences are seen only in public facilities.

Third, the cash transfer predicts an increase in CS, while controlling for beneficiary status. This suggests that increases in disposable income (~25 cents of each peso received) may have influenced delivery outcomes in public facilities. Public facilities in Mexico record *Oportunidades* beneficiary status upon admission. It is possible, therefore, that physicians operating in these facilities were aware of the disposable income among programme beneficiaries, and this provided some incentive to conduct CS—either for additional revenues or as defensive medicine. The effect of physician financial incentives on CS has been well documented.⁶ It is notable that patients attending private clinics in Mexico are likely to pay out-of-pocket for services regardless of beneficiary status. Therefore, the programme did not affect physician incentives in private facilities. This could explain why significant differences in CS rates between beneficiaries and non-beneficiaries are seen only in public facilities.

This study is limited to rural areas and the initial years of programme implementation. Previous facility-based studies in Mexico have reported much higher CS rates.³⁹ However, the intervention population comprises women from the poorest segment of the population (<20th wealth percentile nationally). We do not have data about prior CS; however, the sample is well balanced in observed socioeconomic and maternal characteristics. Subsequent data collection efforts will collect more detailed information about fertility and clinical conditions, which may help to explain delivery outcomes in future research. This research relies on the accuracy of maternal reports. Studies among other low-income populations have demonstrated that mothers can accurately recall perinatal events.⁴⁰

It is notable that nearly one-third of poor rural women in the sample reported having delivered at home. Neither delivery attendance by a skilled health care provider nor facility delivery was an *Oportunidades* programme requirement. Separate regressions for these analyses find that beneficiary status is not a significant predictor of delivery location. Skilled delivery attendance could be considered as a part of the *Oportunidades*' programme requirements in the future.

Many governments have turned to conditional cash transfer programmes to improve the health of poor families. This study suggests that the *Oportunidades* conditional cash transfer programme is associated with higher CS in social security and government health facilities. This effect appears to be driven by the cumulative cash transfer. More investigation is required to determine the pathways for this effect. These findings may be applicable to other large-scale incentive-based welfare programmes, which employ conditional cash transfers and health utilization requirements.

Acknowledgements

The author is grateful for comments and advice from Dilys Walker, but takes responsibility for all errors and omissions. This work was conducted while the author was a visiting scholar at the National Institute of Public Health in Mexico. The funding source has no role in the analysis or interpretation of the data.

Funding

National Institutes of Health; Fogarty International Center.

Conflicts of interest: None declared.

Key points

- Caesarean delivery rates have risen rapidly in many parts of the world. Much of this increase could be attributed to non-medical indications, including financial incentives for health providers and increased patient demand.
- The *Oportunidades* conditional cash transfer programme in Mexico is associated with higher caesarean section rates in social security and government health facilities.
- Policy makers implementing large-scale social welfare programs with health care utilization requirements, such as conditional cash transfers, should consider the income effect of the programme on delivery outcomes.

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Received 11 March 2009, accepted 14 October 2009