Facilitated enrollment in public health insurance: Effects on prenatal care and birth outcomes*

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Abstract

Many countries are expanding public health insurance for the uncovered, but administrative barriers can reduce enrollments. However, lowering barriers may insure people with marginal health benefits and crowd out services to incumbents. We use novel longitudinal administrative childbirth data to examine the impact of *Medical Insurance Century XXI* (SMS), a children's program that auto-enrolled family members in Mexico's *Seguro Popular* (SP) health insurance. SMS increased SP coverage among pregnant women, especially those who previously delivered in private hospitals. This group increased the utilization of prenatal care, without significant changes in birth outcomes, and without negative spillover effects on incumbent women.

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1 Introduction

Many low and middle-income countries are currently working to expand health insurance coverage to previously uninsured people. One popular approach is to create a public option—a health insurance program intended for low-income people who would otherwise lack insurance coverage. Administrative burdens discourage enrollment and can undermine the potential of these programs to improve both the health and the finances of poor families (Nichols and Zeckhauser 1982; Currie and Gahvari 2008; Arbogast, Chorniy and Currie 2024). However, the marginal beneficiary induced to enroll by reductions in administrative hurdles may not be among the poorest or most vulnerable of those eligible (Finkelstein and Notowidigdo 2019; Deshpande and Li 2019). Increasing enrollment among people on the margin between enrolling and not enrolling who may have uncertain benefits could crowd-out services to incumbents with large benefits.

This paper asks how auto-enrollment, one potential way to ease administrative burdens, affected enrollment in Mexico's public health insurance option *Seguro Popular* (SP), as well as utilization of care and health outcomes among both the newly enrolled marginal people and among those already using SP services. Auto-enrollment of pregnant women in SP occurred as a result of the expansion of a second program, *Medical Insurance Century XXI* (SMS), which began in 2006. SMS provided enhanced insurance coverage for children under five, and automatically enrolled the families of these children in SP. This auto-coverage substantially reduced the administrative burden of proving eligibility for and enrolling in SP, which involved presenting several documents and an in-person survey at enrollment locations. While all pregnant women will deliver and can only choose where (but not if) the birth will take place, prenatal care may be sensitive to financial considerations, and forgoing prenatal care could in turn affect health at birth.

We leverage rich longitudinal data on prenatal care and birth outcomes to study the impact of SMS-induced enrollment in SP on prenatal utilization and birth outcomes. Because the SMS program aimed to improve the health of young children and mothers were only incidentally enrolled, this policy provides exogenous variation in maternal SP enrollment. The use of confidential birth data allows women to be tracked across births to study the impact of SMS expansion on SP enrollment for women who previously used a public SP-affiliated hospital (*Secretaría de Salud* or SSA), a private hospital, or a hospital serving formal sector workers (*Instituto Mexicano del Seguro Social* or IMSS).[1] Disaggregating the

[1]In addition to IMSS, the Institute for Social Security and Services for State Workers (*Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado* or ISSSTE) provides similar coverage to civil servants and Mexican Petroleum (*Petroleos Mexicanos* or PEMEX) covers employees in the state-owned oil company. These workers generally use their own ISSSTE or PEMEX facilities, but they account for a very

impact of SMS and SP across the institution of previous birth shows how the enrollment affected both incumbents and new enrollees.

We first ask *who* auto-enrollment induced to enroll, estimating the impact of SMS on SP enrollment disaggregated by the type of institution where each woman's first observed birth in our sample took place. Specifically, the sample is split by women whose first birth occurred in an SSA hospital, a private hospital, or an IMSS hospital. The municipal SMS enrollment rate has the largest impact on women who previously used private hospitals: A 100 percentage point increase in SMS affiliation among children would increase the probability that a mother was insured in SP by 22 percentage points. SMS expansion has a smaller but positive impact on the enrollment of women initially using IMSS hospitals and no detectable impact on women previously using SSA hospitals.

Next, we ask how facilitated enrollment in SP affected the choice of provider for delivery, both for the marginal woman enrolling in SP and among women previously delivering at a private facility. Using SMS as an instrument for SP affiliation, we show that individual SP enrollment increased the probability of using an SSA hospital among women who previously used private hospitals by 58 percentage points, indicating a significant shift in the location (and cost) of care. Importantly, SMS expansion did not crowd-out use of SSA facilities among incumbent women: Reduced form estimates suggest that SMS rollout led to increased use of SSA facilities by women who had already used SSA hospitals for a previous birth, indicating that increased enrollment was not associated with decreased use of the public system by women already using it.

Did expanded enrollment in SP from facilitated enrollment lead to more or better care for marginal newly enrolled mothers? Enrolling in SP caused women previously using private hospitals to receive more comprehensive prenatal care: for mothers whose SP enrollment responded to auto-enrollment, SP affiliation increased first-trimester prenatal care by 29.4 percentage points (p=0.093), or 36% relative to the reported first-birth mean, and "adequate" prenatal care according to international standards, by 34.8 percentage points (p=0.05), or 45% relative to that mean. This increase in care did not translate to detectable changes in observable birth outcomes, and there are no statistically significant effects on the probability that the baby was low birth weight, preterm, macrosomic (or high birth weight), or had an APGAR score below 9 for mothers induced to take up SP from SMS rollout (though some estimates are imprecise). While we are unable to observe indicators of maternal health such as gestational diabetes or other maternal morbidities, this evidence suggests that SP enrollment's primary advantage for the marginal enrollee was likely to be financial.

small share of all births (2.6 percent of ISSSTE and 0.28 percent for PEMEX so these facilities are ignored here).

Finally, we ask whether incumbent mothers saw decreases in care as newly-enrolled women used more prenatal care. Reduced form estimates show that SMS expansion had little impact on prenatal care or birth outcomes for women already using SSA facilities. These findings alleviate concerns that auto-enrollment in SP, which had the largest impacts on women who were previously using private hospitals and who may have been relatively well off, did not come at the expense of those women with a prior SSA delivery.

This paper contributes to a large literature studying the impact of health insurance expansions on infant health following Currie and Gruber (1996). Studies in many contexts have found that expansions of public health insurance can improve prenatal care and health outcomes. Gruber, Hendren and Townsend (2014) study infant mortality in Thailand; Camacho and Conover (2013) examine low birth weight in Colombia; Chou, Grossman and Liu (2014) study post-neonatal mortality in Taiwan; Bhalotra, Rocha and Soares (2016) focus on prenatal care and mortality in Brazil; Dow and Schmeer (2003) study child mortality in Costa Rica. Compared to these papers, most of which focus on overall changes or changes among the very poor, this study focuses on the marginal mothers brought into SP by SMS auto-enrollment. To the extent that these mothers are in better health or have other options, gaining SP may have less impact on their health behaviors or on the health of their infants.

This study also contributes to the literature examining the effects of SMS and SP on maternal and child health. Two previous studies find that SMS was associated with declines in area-level infant mortality rates (Celhay et al. 2019; Urquieta-Salomón et al. 2020). In contrast, we focus on individual-level prenatal care and birth outcomes.[2] Several previous studies have examined the effect of SP on infant and child health outcomes, finding positive effects among the poor (Conti and Ginja 2020; Pfutze 2014, 2015; Sosa-Rubi, Galárraga and Harris 2009; Strouse et al. 2016; Urquieta-Salomón et al. 2020). However, auto-enrollment through SMS likely reached a different group: lower-income women who were at the margin between enrolling in SP and using SSA hospitals, and paying for care in private hospitals out of pocket. While SP alleviated the financial burden of health care for these women (Knaul et al. 2012; Barros 2008; King et al. 2009; Galárraga et al. 2010; Grogger et al. 2015), the

[2]Individual natality data is difficult to link to mortality data in Mexico, so these studies of infant mortality analyze changes in aggregate area-level rates. However, since infant mortality has shown an overall downward trend over the past couple of decades and since SP only experienced expansions (and no contractions) over its rollout period, estimates based on aggregate mortality rates may simply reflect overall municipio-level trends in mortality. Hence, we do not repeat these analyses of aggregate-level infant (or maternal) mortality here. A related caveat about studies of the early SP rollout is that it coincided with rapid improvements in medical facilities and physician-patient ratios, and so studies of the SP early rollout likely capture the effect of these improvements as well as the effect of individual insurance coverage. In contrast, we show that the later SMS rollout was not correlated with increases in infrastructure, so our estimates can be interpreted as the impact of enrollment alone. Studies focused on other types of health outcomes include Bleich et al. (2007) and Parker, Saenz and Wong (2018).

fact that they had not enrolled previously suggests they may have perceived lower financial or health benefits than those who had enrolled initially.

Hence, this paper adds to a growing literature about the marginal person deterred from enrolling by the existence of administrative barriers, and the heterogeneous treatment effects of public programs, such as Finkelstein and Notowidigdo (2019) who study administrative barriers to enrollment in SNAP, and Deshpande and Li (2019) who study changes in enrollment procedures for Social Security. These studies find that the marginal person encouraged to enroll by declines in administrative barriers is less needy than the average enrollee. In addition to investigating this question, we also ask how the enrollment of these marginal persons affected incumbent beneficiaries.

Finally, following Cutler and Gruber (1996), a large U.S. literature has focused on the idea that expansions of public health insurance might make it attractive to switch from private health insurance to the public plan, thereby creating additional costs to the government and "crowding out" services for those who need them most.[3] In the Mexican context, it is less clear that the cost to the government was a major concern given the very small percentage of the population ($\sim$1%) with private health insurance, but crowding of facilities was a potentially more important problem.[4]

We make three contributions relative to the crowd-out literature. First, most of the U.S. literature relies on datasets with limited information about the timing of coverage whereas our data has the type of insurance coverage (or lack thereof) at the exact time of the birth. Second, most studies on the U.S. cannot follow people over time, whereas we can follow the same woman and see how her individual choices change with SP enrollment. Third, this is the first paper to use individual-level administrative panel data to examine these questions in a low or middle-income country.

The rest of the paper is laid out as follows. Section 2 provides useful background about the Mexican healthcare system and the expansion of the SMS and SP programs. Section 3 introduces the data and Section 4 presents our empirical strategy. Section 5 presents the results and Section 6 offers a discussion and conclusion.

[3]See Blumberg, Dubay and Norton (2000); Card and Shore-Sheppard (2004); Ham and Shore-Sheppard (2005); Hudson, Selden and Banthin (2005); LoSasso and Buchmueller (2004).

[4]An additional concern in the Mexican context is whether insuring people in the informal sector encourages informality. This is a controversial question and the evidence is mixed. Some studies such as Bosch and Campos-Vazquez (2014), Aterido, Hallward-Driemeier and Pagés (2011), Gruber and Simon (2008), Conti, Ginja and Narita (2018), and Levy (2010) find that SP caused a significant reallocation of employment away from the formal economy and into the informal one, especially among the less educated. Others, like Barros (2008) and Azuara and Marinescu (2013), find no evidence of such shifts into the informal sector for the overall population. Since we do not directly observe employment, we do not address this question, though the fact that mothers first observed delivering in IMSS hospitals are more likely to deliver in SSA hospitals when SMS expands is suggestive of some shifting to the informal sector.

2 Background: The healthcare system in Mexico

The Mexican healthcare system can be divided into three main subsystems: the IMSS and other public contribution systems funded by the formal sector, private healthcare largely paid for out-of-pocket, and the SP/SSA system. Because each of these systems have their own hospitals, the location of birth is informative about the type of care a woman uses: If a woman delivers in an IMSS hospital, one can infer that she is covered by the formal sector, whereas if she delivered in an SSA hospital she is unlikely to have formal sector coverage.[5]

Formal sector workers and their families pay into a system run by IMSS which provides medications and free medical services through its own facilities.[6] To switch from IMSS to SP a woman or the family member who provided insurance coverage would have had to switch from formal sector employment to the informal sector or to unemployment.

Private healthcare is also widely available in Mexico (Frenk et al. 2006). Private care is used by people outside of the formal sector, a very small number of people with private insurance,[7] and by people who have IMSS coverage but prefer to be seen in separate private health facilities and pay out of pocket.[8] From 2006 to 2012, the share of births in SSA hospitals increased from 29.6 percent to 43.1 percent, coincident with a large decline in the share of births in private facilities.

SP was a public, noncontributory, health insurance program created in the early 2000s to achieve universal health coverage, ease the financial burden associated with health care costs, and improve health outcomes. SP offered free access to primary, secondary, and tertiary health services to those who were not covered by the social security system; that is, individuals who were not formally employed, or without a family member (spouse or parent) in formal sector employment.[9] The informal sector represented 55 percent of the population in 2010 (World Bank 2012).[10]

[5]Among IMSS births, 99.3% have IMSS coverage (and only 0.13% SP), while at SSA 91% have SP (and only 0.17% IMSS). IMSS facilities are legally required to provide care for obstetric emergencies which is why there is a very small number of women covered by SP who deliver in IMSS facilities.

[6]Workers covered by the IMSS system must pay insurance premiums whether they use IMSS facilities or not and their contribution is automatically deducted from their paychecks.

[7]Private health insurance is sometimes offered as an employment benefit for formal sector workers even though both employers and employees would still need to pay IMSS contributions. However, Instituto Nacional de Salud Pública (2012) indicated that only 1 percent of the population had private health insurance.

[8]According to Instituto Nacional de Salud Pública (2012), the share of IMSS beneficiaries receiving inpatient care from private providers was 12.7 percent in 2012, compared to 31.1 percent of people with SP. IMSS beneficiaries were more likely to use private providers for outpatient services (30.9 percent). Only 4.1 percent of people covered by IMSS had sought care in a public institution other than IMSS.

[9]Workers in these families were self-employed, unemployed, out of the workforce, employed by informal firms, or hired "informally" by formal-sector firms.

[10]SP was discontinued in 2020 and replaced with a new program called Instituto de Salud para el Bienestar (INSABI).

Before SP, the uninsured had to pay for care at both public and private facilities. Public facilities charged a means-tested progressive fee (*cuota de recuperación*) and often asked patients to cover the costs of medications out of pocket (Frenk et al. 2006). Monetary costs were generally substantially lower at public than at private facilities, though waiting times were lower in private settings (a mean of 46.9 minutes vs 26.3 minutes for outpatient care) and private quality was perceived to be better (Instituto Nacional de Salud Pública 2000).[11] In 2012, 39 percent of the population received outpatient care and 17 percent received inpatient care from a private provider (Instituto Nacional de Salud Pública 2012).

By the start of our sample period in 2008, pregnant women were allowed to enroll in SP immediately on confirmation of their pregnancies. SP covered medical services related to prenatal, obstetric, and perinatal care with no fee, and services were delivered in SSA hospitals and clinics.[12] Administrative enrollment costs were non-trivial: to enroll in SP, individuals had to go to an SP enrollment location in person and present specific documents. Applicants also needed to fill in a survey used to determine whether they needed to pay a fee, even though in practice fewer than one percent of families were charged (Knaul et al. 2012).[13] By early 2005, at least some areas in all 32 Mexican states had joined SP and by 2006 it was the second largest health insurance scheme in the country after IMSS (Frenk et al. 2006). Additionally, while the government worked to expand the supply and increase the quality of health care in the early years of SP (Sosa-Rubi, Galárraga and Harris 2009),

[11]Instituto Nacional de Salud Pública (2012) indicates that SSA hospitals had the longest waiting times, with an average of 102 minutes of waiting time compared to 93 minutes in IMSS. However, SSA hospitals had a higher share of users reporting good or very good quality of services than IMSS users (83 percent vs. 77 percent), though private clinics had the highest share with 93 percent. Private clinics also had a lower share of reports of bad or very bad service compared to IMSS (4 percent vs. 6 percent). The overwhelming majority of IMSS users report using that hospital because of their insurance (92%). Sixty percent of SSA hospital users report insurance as the main reason, 22 percent cite cost, and 25 percent cite nearby location. Only 5 percent and 8 percent of IMSS and SSA patients reported using these facilities because they liked the service, while 28 percent of private clinic patients gave this reason.

[12]Prenatal and obstetric care within SP usually occur in different facilities (clinics vs hospitals) and women's pregnancies are not assigned to a specific physician for follow up. With SP coverage, women could deliver in any SP/SSA hospital. Some women might be willing to pay out-of-pocket for private prenatal care to avoid longer waiting times at SSA facilities, but still choose to deliver with SP to avoid the heavier financial burden of childbirth. Other women could choose to receive free prenatal care but choose a private clinic with higher perceived quality for delivery (Sosa-Rubi, Galárraga and Harris 2009; Gómez Barojas and Carrasco Gómez 2020). We present suggestive evidence that rollout of SMS was associated with increases in publicly provided SSA prenatal care.

[13]The documentation required included an official ID card, national identification number (CURP), and proof of residence. The socioeconomic survey was the Cédula de Características Socioeconómicas del Hogar. Children under 5 requiring emergency care were also allowed to register to SP ex post after receiving the required healthcare. `https://www.gob.mx/cms/uploads/attachment/file/384970/Gu_a_Gu_a_de_Afiliaci_n.pdf`. For pregnant women, there was more flexibility (e.g. incomplete or expired documents might be accepted and the questionnaire could be waived because there was no fee.) Participants in Mexico's federal conditional cash-transfer poverty alleviation program, Prospera (originally named Progresa, and later, Oportunidades), were automatically enrolled.

improvement slowed and became more challenging after an initial period of expansion (Knaul et al. 2012).[14]

Beginning on Dec. 1, 2006, the SMS program provided additional coverage to children under five who were born after the program's start date. The only eligibility requirements for SMS were that children had to be under five and not covered by formal sector insurance. By 2018, over 150 separate interventions (diagnostic procedures, hospitalizations, surgeries, or medications) were covered, up from 108 in 2006 (Celhay et al. 2019). SMS provided a one-time transfer to state governments for each child enrolled, as well as additional reimbursements to health care providers for covered interventions. Crucially for our design, children and their family members were automatically enrolled in SP when children were enrolled in SMS (Celhay et al. 2019). SMS was popular and expanded rapidly: The fraction of the population living in areas with SMS expanded from 20% in 2007 to 80% by 2009 (Celhay et al. 2019) and over 80% of the eligible population was enrolled by 2011.

Figure 1 shows that gains in SMS coverage were uneven, ranging from close to zero in some places to near 100 percent in others. Because this expansion came when SP was already a well-established program, the marginal people who were induced to enroll in SP by the SMS expansion may have been quite different than those enrolled in SP initially. Those induced to enroll by SMS were eligible for SP but had not chosen to enroll previously, suggesting that they may not have been the population at greatest need, or alternatively, that they were heavily deterred by administrative barriers to enrollment. We show below that SMS enrollment at the *municipio* level is predictive of an individual mother's SP enrollment in models that include *municipio* and state-by-year fixed effects.[15] These models only exploit variation in the penetration of SMS within a state and year.

3 Data

Data on individual SP enrollment, type of hospital, and birth outcomes comes from confidential data provided to the authors by the *Secretaria de Salud*. These data, which record birth information from 2008-2014, are a subset of the public birth records data for those years and include an anonymized mother identifier. Because of the inclusion of this unique identifier, the data only include births if the mother's national identification code (CURP)

[14] Between 2001 and 2011, 15 high-specialty centers, 200 hospitals, and about 2,000 clinics were built, and many more were renovated. The number of physicians grew by 38% between 2004 and 2010.

[15] *Municipios* are the second smallest administrative unit in Mexico after states. Some cities are composed of several *municipios* (e.g., 16 *municipios* in Mexico City), and *municipios* are also defined to include rural areas. Because the English word "municipality" means an urban area, we retain the Spanish word here. There are 2,454 *municipios* in Mexico.

was recorded.[16] In principle, all mothers born after 1996 should have a national ID number. However, not all births are recorded with this number as (i) some mothers may not have gone through the paperwork to obtain one, (ii) since the number is not used day-to-day, some women may not know it, and (iii) hospitals may not systematically collect it.

Where it is present for two or more births to the same mother, the inclusion of the (scrambled) national identification number in the confidential data allows births to the same mother to be matched. In addition to the mother ID and SP status, these data include information on the type of hospital, utilization of care (Cesarean section delivery, use of prenatal care),[17] birth outcomes (birth weight, Apgar score, gestational age, birth order), and maternal characteristics (education, marital status).[18] As shown below, births with national identification numbers appear to be very similar on average to births without.

Importantly, the confidential data do not include the mothers' *municipio* of residence. To recover the *municipio* of residence, the confidential data was merged to the universe of birth certificates (*certificados de nacimientos*) which have been compiled by the SSA since 2008 (this is the public use Mexican natality data or SINAC data). This step allows the recovery of *municipio* for 94 percent of the mothers with a mother ID, and births with a mother ID represent 55 percent of the births recorded in SINAC. Because our estimation strategy disaggregates estimates based on the location of the *first* birth, the estimation sample is further limited to mothers who have at least two (singleton) births and have all variables observed.

Finally, mothers' *municipio* of residence is matched to administrative data about the share of eligible children covered by SMS in a *municipio*-year, which is available from 2008–2014. This coverage variable is obtained by dividing an estimate of the number of SMS beneficiaries by 2010 Census estimates of the population of 0–4-year-olds.[19]

The means in our analytical sample can be benchmarked against the public use SINAC

[16]The data we received was de-identified and did not include CURP but rather an anonymous mother identifier.

[17]While the births data include information on type of institution where the birth occurred and information on prenatal care (number of appointments, trimester of first appointment), it does not provide information on the type of institution where prenatal care was received, and it may or may not be with the same type of healthcare provider (SP, IMSS, private) as the delivery itself.

[18]Unfortunately, no further information about mothers' health before or after delivery is available. For example we do not know whether mothers suffered from hypertension or diabetes as is noted on U.S. birth records.

[19]The SMS coverage data were only made available as a share of the uninsured 0–4 population in each municipio-year. To avoid the endogeneity of using the uninsured population in the denominator, we back out an estimate of the number of affiliated children using data from CONAPO. We estimate the number of affiliated children as the provided data (share of the uninsured 0-4 population) times the share of the population that is uninsured in each municipio-year times the 0-4 population. Appendix Figure A1 plots this inferred number of affiliates against publicly available state totals from nearby years, showing that these closely align.

to compare how women with an identifier compare to the universe of births over this period. Column 1 of Table 1 shows means from the universe of births (SINAC), while column 2 shows means from the confidential data set of mothers with identifiers. This comparison suggests that the confidential data is close to being a random sample, as the means of all observables are very similar, both in terms of prenatal care and birth outcomes and in terms of sociodemographic characteristics (education, rural status of the municipality).

The third column of Table 1 shows means for mothers with two or more births over the sample period in the confidential data. Compared to the full confidential sample, mothers with 2+ births observed are somewhat less likely to have completed middle or high school, are about a year younger, are more likely to have previously delivered in an SSA hospital, are less likely to have received a Cesarean section, and received fewer prenatal visits. These patterns are intuitive for the sample restriction as mothers of lower socioeconomic status are likely to have more children. However, their newborns are less likely to be low birthweight, which is likely because the restriction excludes women with only one child and first children are at higher risk for low birthweight. Note that inclusion in the sample of two or more observed births in the 2008-2014 window is not only a function of lifetime fertility, as some mothers with additional children before 2008 or after 2014 are also excluded. This fact may explain why differences are not dramatic for most variables. In the subsequent analysis this imbalance is addressed by weighting observations in the analytical sample by their inverse probability of appearing in the full SINAC sample of births.[20]

The fourth column focuses on mothers in the confidential sample who had 3+ births. This is the sample used in alternative mother fixed effects models that are discussed in the robustness section below. These mothers are similar to those with 2+ births in some respects, but they are younger, less educated, more likely to use an SSA hospital, use less prenatal care, and are less likely to have a Cesarean section delivery.

The remainder of Table 1 divides mothers from the confidential sample with 2+ births into three categories depending on where their first observed birth was delivered. The means in these columns are taken excluding the first observed birth for these mothers, as we focus only on subsequent deliveries in our analysis. The data for average numbers of births suggest that most of these subsequent births are second or third births, consistent with overall Mexican total fertility of about 2.34 births per woman in 2010. That is, there are not a lot of higher order births. Almost all births in Mexico take place in a hospital or clinic: Only 1% of births

[20]Weights are constructed using mothers' state of residence, age, and civil status as auxiliary variables. We construct weights to make the mother-identified sample representative of the universe of births recorded in SINAC. Strata are defined based on combinations of maternal age, civil status, and state of residence. For each stratum, weights are calculated as the ratio of the stratum's share in SINAC to its share in the mother sample.

overall and in the 2+ births sample occurred at home.

Comparing these columns shows that mothers who previously delivered in SSA hospitals are less educated, younger than other mothers, and more likely to be rural.[21] They receive fewer prenatal care visits and are less likely to deliver by Cesarean section. However, there are no meaningful differences in the health of their babies as measured by birthweight, gestational age, or Apgar scores. Mothers who previously delivered in private hospitals have strikingly high rates of Cesarean section delivery.

The rates of delivery in different institutions suggest a fair amount of movement between hospital settings. For example, among women who previously delivered in a private hospital, 21 percent subsequently give birth in an SSA hospital and 11 percent give birth in an IMSS hospital. Among those who first gave birth in an IMSS hospital, 19 percent give birth in an SSA hospital, which is quite similar to the fraction of "switchers" among those who used private hospitals. Women who initially delivered in an SSA hospital have the highest rates of persistence, but even in this group, 12 percent went on to deliver in an IMSS hospital, and 6 percent in a private hospital.

4 Empirical Strategy

Our empirical analysis seeks to estimate the impact of SMS-induced SP enrollment on prenatal care and birth outcomes. Because SP affiliation is endogenous and correlated with maternal characteristics, Ordinary Least Squares (OLS) estimates of the direct effects of becoming covered by SP may be biased: Women choosing to enroll in SP must have low incomes and may therefore be likely to use public hospitals (the cheapest option for non-IMSS people) in any case. They may also have worse health care utilization patterns and infant health outcomes on average. Moreover, an individual pregnant woman's take up of SP might be affected by factors such as the projected cost of maternity care services (due to repeated Cesarean sections, for example), or the type of hospital she wishes to deliver in. A third issue is that the initial rollout of SP had already begun before the start of the confidential administrative birth data we analyze.

Hence, we address the endogeneity of SP adoption using the SMS enrollment rate at the *municipio*-level as a source of variation in the probability that a mother enrolled in SP. To study the impact of SP on complier mothers who enrolled in SP due to the SMS rollout, *municipio*-level SMS enrollment is used as an instrumental variable for individual

[21] We define a rural *municipio* as one in which none of the localities that make up the *municipio* have more than 10,000 people. This definition gives us a fraction rural that is comparable to that reported by Mexican statistical agencies.

SP enrollment. Additionally, the impact of SMS enrollment on mothers who previously used SSA hospitals provides evidence on whether SMS, which induced more women to adopt SP, indirectly impacted women already using SSA hospitals. As discussed above, women who enrolled their child in SMS, which was easy to do, were auto-enrolled in SP, making their enrollment "incidental" to the enrollment of a child. This was one of the simplest ways to access SP. SMS was not available uniformly throughout the country, so there is an exogenous policy element affecting the mother's ability to enroll her child.

An important question affecting the legitimacy of the instrument is whether SMS affected outcomes mainly through facilitating SP enrollment, or whether it coincided with other improvements in the medical care environment or in fertility that could have affected outcomes. This question is addressed in Table 2, which uses *municipio*-year level data and a two-way fixed effects framework to investigate correlations between SMS penetration, birth rates, and measures of the availability of medical care. The outcomes examined include births per 1,000 residents, number of prenatal appointments in SSA clinics, and data on the numbers of doctor's offices, beds, and doctors in SSA facilities. Following our main specifications outlined below, regressions include *municipio*-year level averages of mother's age, number of pregnancies, maternal education, maternal marital status, and child gender. Regressions are weighted using the number of observations in the births sample in each *municipio*-year.

Table 2 shows little evidence that the SMS rollout was associated with either changes in fertility[22] or changes in the availability of medical resources: SMS expansion is not followed by increases in the number of doctor's offices, doctors, gynecologists, pediatricians, or beds. If anything, SMS was associated with fewer specialized doctors (gynecologists and pediatricians), but the magnitudes of the estimates are trivial: An increase of 1 percentage point in the SMS enrollment rate is associated with a marginally significant 0.2% fall in the number of gynecologists and pediatricians. SMS rollout is associated with a significant increase in subsequent prenatal care visits at SSA clinics, consistent with the main results discussed below.

A second important question is whether places that expanded SMS more quickly were on a different path prior to SMS expansion. This question is addressed in Appendix Figures A2 and A3 which present event studies for the medical care utilization and health outcomes. Here an event is defined as crossing the 20 percent SMS coverage threshold in a *municipio*-year.[23] Using this threshold, about half of the observations are excluded because they are

[22]This result is consistent with Bitler and Zavodny (2010) who conclude that "We find little evidence that the Medicaid expansions led to changes in birth rates or abortion rates."

[23]The event studies do not include municipios that are "always treated" as including them would generate contaminated comparisons in a staggered DiD setting (Borusyak, Jaravel and Spiess 2024). When using the 20% threshold about 54% of municipios are dropped. A 10% threshold would lead to dropping 89% of

"always treated." Treated units are compared to those who never exceed the threshold and those that exceeded it at some later date. Event studies are estimated using both the Callaway and Sant'Anna (2021) estimator and the Borusyak, Jaravel and Spiess (2024) estimator. Neither set of event studies show signs of any consistent pre-trends for any of the newborn health or utilization outcome variables.

More generally, our IV strategy relies on the exclusion restriction holding, namely that SMS expansion affects maternal outcomes through mothers' own SP-affiliation. This restriction might not be satisfied if, for example, SMS coverage of young children reduced households' out-of-pocket spending on child health care, thereby freeing resources that mothers could use for prenatal care. While we do not directly observe expenditures, Table A1 in the Appendix shows that SMS predicts substitution *away* from private hospitals, the opposite direction from what one would expect if income effects from SMS directly increased investment in more or better health services. Moreover, IMSS and SSA hospitals offer fixed schedules of prenatal care appointments, so women seeking to discretionally increase their prenatal care would need to seek providers affiliated with private hospitals to do so.[24]

Estimates of the effects of SP on outcomes are presented in a 2SLS framework. The first stage involves estimation of the effect of *municipio*-level penetration of SMS on a mother's individual probability of being enrolled in SP. This estimation is presented for the whole sample and for each of the three sub-groups defined by type of hospital for the first observed birth. These equations take the form:

$$SP_{imnst} = \alpha_1 + \alpha_2 \%SMS_{nst} + \alpha_3 X_{it} + \mu_n + \omega_{month} + \phi_{st} + \varepsilon_{imnst}, \tag{1}$$

where SP_{imnst} indicates SP affiliation for woman i residing in *municipio* m, in state s, with birth in year t. To address the fact that women might endogenously move to places that had greater SMS penetration between the births, a mother's *municipio*-level SMS exposure is measured in the place of the first observed birth (n) irrespective of whether she later moved.[25] The measure of *municipio*-level SMS exposure is therefore $\%SMS_{nst}$, the share of children under 5 enrolled in SMS in the *municipio* of the first observed birth in year t. The vector X_{it} includes controls for mother's age, schooling levels, marital status, number of births (including the index birth), birth spacing (years between observed births), and the sex of the newborn.

municipios.

[24]Although prenatal care usually occurs in a stand-alone clinic, each clinic is explicitly affiliated with a hospital or hospital system.

[25]In practice, 87 percent of women stay in the same location between births, so in most cases m and n are the same and $\%SMS_{nst}$ is therefore highly predictive of a woman's actual exposure to SMS at time t. Below, we present results including both sets of fixed effects as a robustness test.

Fixed effects for the (fixed) *municipio* of residence, μ_n, are included to capture factors such as the quality of medical services available in the *municipio* of residence and the average health of the *municipio*'s residents. Our preferred specifications include state-by-year fixed effects (ϕ_{st}), as well as fixed effects for (calendar) month of delivery, ω_{month}. Hence, changes in outcomes are attributable to SMS rollout within the same state and year, and capture aggregate changes, such as changes in the number of interventions covered by SMS. Standard errors ε_{imnst} are clustered at the (fixed) *municipio* of residence, n, level to allow for factors that affect all pregnancies within a *municipio*. These regressions are weighted by the inverse probability of appearing in the full SINAC sample. Estimation of Equation (1) disaggregated by the institution of first birth is informative about whether SMS expansion had different impacts on affiliation for women initially using the different healthcare subsystems.

The impact of SP affiliation on women induced to enroll by SMS is estimated using the following two-stage least squares (2SLS) equation:

$$Outcome_{imnst} = \gamma_1 + \gamma_2 PredSP_{imnst} + \gamma_3 X_{it} + \mu_n + \omega_{month} + \phi_{st} + \zeta_{imnst}, \tag{2}$$

where $PredSP_{imnst}$ is calculated using Equation (1). There are three sets of outcomes. The first is a dummy variable indicating whether the type of hospital where the mother delivered was an SSA hospital. This complements the first stage, asking whether SP affiliation causes a switch in the type of facilities used. The second set of outcomes include measures of utilization of care: whether the first appointment occurred in the first trimester, an indicator for prenatal care adequacy,[26] and whether the delivery was by Cesarean section. Finally, we test for whether SP affected infant health outcomes, including indicators for low birth weight (LBW, birth weight <2,500 grams), whether the baby was preterm (born before 37 weeks of gestation), an indicator for APGAR <9/10 (a measure of health at birth), and macrosomia (birth weight>4,000 grams).[27]

Finally, reduced form models of the impact of SMS enrollment on utilization of care and health outcomes are estimated, conditional on the institution of first birth. These regressions take the form:

$$Outcome_{imnst} = \delta_1 + \delta_2 \%SMS_{nst} + \delta_3 X_{it} + \mu_n + \omega_{month} + \phi_{st} + \upsilon_{imst}, \tag{3}$$

[26]Prenatal care adequacy is measured using two criteria: Care must have started in the first trimester, and the total number of visits must be at least 50 percent of the number recommended given the length of gestation (Kotelchuck 1994).

[27]Macrosomia was included because it can lead to complications of labor and delivery (Júnior et al. 2017). Large size at birth has also been related to future obesity of both mothers and children (Ludwig and Currie 2010). Given the very low fraction of births with very low birthweight, and the very high fraction that receive at least some prenatal care, we do not examine these outcomes.

Estimating reduced form specifications allows us to test for an indirect effect of SMS-induced SP enrollment on mothers whose own SP enrollment was not directly affected by SMS. That is, if women who had previously given birth in an SSA hospital see no change in SP enrollment with higher SMS penetration, but still experience a reduction in prenatal care or health outcomes, then this result might reflect a congestion effect resulting from higher numbers of other women being enrolled in SP. Moreover, crowding the neediest women out of care could have negative health effects.

In addition to the models discussed above, several models are estimated to test the robustness of the findings. First, models that exclude mothers in the smallest 5 percent of municipios in terms of their population are estimated, as the SMS enrollment rate may be measured with more error in small places. A second robustness check excludes mothers who had more than 15 prenatal care visits. For an uncomplicated pregnancy, the recommended number of appointments ranges between 12 and 14, depending on when prenatal care begins and gestation (Peahl and Howell 2021). The average Mexican mother has about 7.5 visits so mothers with more than 15 appointments may have unobservable health problems that necessitate more care, and which could affect their choice of provider. A similarly motivated robustness check excludes mothers whose first observed delivery was premature. We also estimated models for low-schooling mothers (defined as those with middle-school or less) since previous work has suggested that these women experienced the largest gains from SP enrollment. Additionally, we estimate a model including fixed effects for both the mother's first observed location and the current municipio of residence.

Finally, results are reported from specifications that include mother fixed effects. In these models changes in individual SP affiliation predict changes in outcomes. Including mother fixed effects is attractive because it allows us to control for unobserved, static mother characteristics. However, these specifications result in a significant reduction in the number of observations given that we must use women with 3+ births to control for birth spacing (since birth spacing is mechanically absorbed by the mother fixed effect for women with only 2 births). Birth spacing is a crucial control in this context since women with longer birth spacings mechanically faced larger changes in SMS penetration rates and spacing is strongly correlated with utilization and health outcomes.

5 Estimates

5.1 First stage estimates

First stage estimates of Equation (1) are shown in the first column of Table 3. Municipio-level SMS enrollment at the time of the second observed child's birth is predictive of an individual mother's enrollment in SP in the full sample, with a first-stage F-statistic of 10.773, as shown in Panel A. The remaining panels of the table break the sample down by where the mother delivered the first observed child.

Panel B shows that changes in SMS enrollment have little impact on mothers who originally delivered in an SSA hospital. That there is no significant increase in enrollment is unsurprising given that many of these mothers were likely already enrolled in SP.

Panel C shows that mothers who originally gave birth in private hospitals are however strongly affected. Places with a typical increase in SMS enrollments of about 50 percentage points would have seen a 69 percent increase in SP enrollment ($= 0.5 \times (0.221/0.161)$) with a strong first stage F-statistic of 26.54.[28]

Panel D shows that there was a smaller (though still statistically significant) effect on mothers who initially delivered in IMSS hospitals. The first column shows that in the full IMSS sample, a 50 percentage point increase in SMS enrollments would increase the probability of SP enrollment by 6.6 percentage points, which is a large increase relative to the baseline SP enrollment rate of 2.4 percent for these mothers. Unfortunately, the first-stage F-statistic is weak for women who delivered their first birth in an IMSS hospital (F-statistic of 5.18), which limits what can be inferred from IV models.[29] In view of the weak first stages for first-time SSA and first-time IMSS mothers, the 2SLS estimation focuses on the overall estimates and those for first-time private mothers.

The second and third columns of Table 3 show the robustness of the first stage estimates to adding municipio-level time trends (column 2), and mother fixed effects (column 3). The point estimates are quite similar, indicating that the SMS rollout predicts SP affiliation in the overall sample, and in those who initially delivered in private and IMSS hospitals.

[28] Splitting the sample by whether the mother initially had a C-section or not produced similar estimates which suggests that women who enrolled in SP because of the SMS rollout were likely enrolling because of the benefits their child would receive and not because they anticipated a more costly future labor and delivery.

[29] We also attempted to break out the small number of first observed births that took place at home. Perhaps surprisingly, these mothers had an SP enrollment rate of 44 percent at the time of the first observed birth, which is only slightly lower than the overall average in the comprehensive SINAC national data. However, the first stage F-statistic is quite weak for these mothers. Given the small number of mothers and the weak first stage, we do not attempt to estimate models for the subset of mothers who initially gave birth at home.

However, the first stage F-statistics are weaker for the mother fixed effects models, in part because of the smaller sample, limiting the interpretability of later IV-FE estimates of the effects of SP.

Table 4 shows IV estimates (Equation (2)) of the impact of SMS on an indicator for the birth occurring in an SSA hospital.[30] There is a strong overall effect and estimates for mothers who initially delivered in private hospitals are also statistically significant and large: These mothers see a 58 percentage point increase in the probability of delivering in an SSA hospital if they enroll in SP. However, the coefficient of 0.578 is still significantly less than one suggesting that even women induced to enroll in SP by SMS do not always deliver at an SSA hospital. This pattern suggests that some women induced to enroll in SP through SMS auto-enrollment may still prefer to incur out-of-pocket expenses to deliver at a private hospital, likely due to higher perceived quality, travel costs, or congestion at the public facility.[31]

5.2 Effects of individual SP enrollment on utilization of care and infant health

Naïve OLS estimates of the relationship between individual maternal SP enrollment and utilization of care are shown in Appendix Table A3. SP enrollment is negatively related to prenatal care utilization and associated with worse health outcomes for those who initially delivered in a private hospital. These results suggest that women enrolling in SP prior to their second observed birth are selected in a way that is predictive of lower utilization of care and poorer health outcomes, especially in the group that initially delivered in a private hospital.

In contrast, IV estimates of Equation (2) are shown in Table 5 and suggest that there are no statistically significant effects on health at birth overall, though the standard errors are relatively large. However, mothers who initially delivered in a private hospital see large increases in the utilization of prenatal care, increasing both the probability that care is initiated in the first trimester ($p = 0.093$) and the probability that the overall amount of prenatal care received is adequate ($p = 0.05$). These effects are consistent with a reduction in the cost of prenatal care when women are covered by SP relative to paying out of pocket

[30]For completeness, naïve OLS estimates showing the relationship between individual SP affiliation and using an SSA hospital are presented in Appendix Table A2. These estimates show that being enrolled in SP is strongly predictive of having an SSA delivery, independent of where the first birth occurred. These results suggest, not surprisingly, that women who endogenously remain in SP or newly enroll in SP after their first observed birth are more likely to subsequently use SSA services.

[31]These women might still be receiving prenatal care from SP and benefitting from the program. Place where prenatal care was received is not available in the data.

for private care. There are no statistically significant effects on the probability of C-section.

5.3 Reduced form estimates of effects of SMS expansion on utilization of care and infant health among incumbent mothers

Table 6 reports reduced form estimates of SMS expansion on healthcare utilization and birth outcomes among women who had already used an SSA hospital for their first observed birth. While these women did not see an increase in the probability of being insured by SP from SMS-facilitated enrollment, their ability to obtain care and their health outcomes could have been affected by increased congestion from enrollment induced by SMS expansion.

Column (1) shows that SMS increased the probability of delivering in an SSA hospital among incumbent women, indicating that already-affiliated women were actually more likely to stay in the SSA system as marginal women from private hospitals entered. Columns (2) through (4) report the reduced form impact of SMS expansion on healthcare utilization. The estimates are small and noisy, showing little evidence that incumbent SSA women were crowded out of prenatal care. The last four columns of Table 6 report the reduced form effects of SMS on health outcomes. These estimates again suggest that there were no ill effects on incumbent women who had initially delivered in an SSA hospital after the influx of new SP enrollees.

5.4 Robustness

Estimates similar to those in Table 5 and Table 6 except that they also include a municipio-level time trend are reported in Appendix Tables A4 and A5. The estimates are very similar to those in Tables 5 and 6, demonstrating that municipio-level trends in prenatal care and infant health are not driving the baseline estimates.

Table 7 shows the robustness of the estimates to using different subsamples of the data including dropping women with 15+ prenatal care visits, rural women, and women with a previous premature delivery (in rows 2, 3, and 4 of each panel, respectively). The estimates are consistent with those in the full sample: the use of prenatal care increases among women who initially delivered in private hospitals but there is no impact on health outcomes. Estimates focusing on less educated mothers who have only middle school or less are shown in the final row of each panel. This sample is relatively small and none of the estimates are statistically significant. But the point estimates suggest an effect on the probability of getting prenatal care in the first trimester that is at least as large as in the full sample. Additionally, Appendix Tables A6 and A7 show the baseline results with municipio fixed

effects for both the mother's first observed municipio of residence and the current municipio at time of the index birth. The estimates are similar but less precisely estimated.

IV estimates including mother fixed effects are shown in Appendix Table A8. These estimates are imprecise and have a weak first stage. However, the point estimates suggest improvements in prenatal care utilization that are comparable to those in Table 5. Similarly, Appendix Table A9 reports the results of estimating the reduced form model including mother fixed effects, and the estimates are very similar to the baseline specification.

6 Discussion and Conclusions

We use novel administrative birth data from Mexico that allows us to track births to the same mother in a large, national, sample to investigate the extent to which auto-enrollment in the Seguro Popular health insurance program affected choice of hospital for delivery, utilization of care, and health outcomes. Auto-enrollment in SP occurred because of the expansion of the SMS program, which offered enhanced coverage of children under 5 with minimal enrollment requirements and also automatically enrolled all family members in SP. Leveraging variation in the availability of SMS across time and space, we investigate the impact of these incidental enrollments both on the marginal mothers induced to enroll in SP, and on incumbent mothers.

Municipio-level enrollments in SMS are strongly predictive of individual maternal enrollment in SP, especially among women who initially delivered in private hospitals. These women see a 58 percentage point increase in the probability of delivering in an SSA hospital when they are auto-enrolled in SP. This shifting likely represents a significant reduction in the financial burden of childbirth, consistent with SP's goals. SP enrollment also increased for mothers who initially gave birth in IMSS facilities.

Although there are no changes in health at birth or the probability of C-section, we do observe increases in the utilization of prenatal care among women who initially gave birth in private hospitals. These mothers were both more likely to initiate care in the first trimester, and more likely to have an adequate number of prenatal care visits, consistent with the lower cost of obtaining prenatal care under SP. These increases in prenatal care utilization among new enrollees do not appear to have had any adverse effects on prenatal care utilization or health outcomes among incumbent women who were already using SP services.

Pregnancy and delivery services are costly compared to the average income of families in Mexico: A private sector vaginal delivery at the low end of the price distribution was equivalent to about 12.0 percent of the average yearly household income of MXN $139,744

in 2010, while a C-section cost about 15 percent of annual household income (INEGI 2010).[32] SP coverage of these services therefore represents a sizeable transfer to families at the lower end of the income distribution. Moreover, health insurance may also reduce financial burdens on the recipient's network, friends, and family, who might otherwise be called on to help pay for a financial emergency such as childbirth (Nikolov and Bonci 2020; Orraca-Romano 2015; Geng et al. 2018; Strupat and Klohn 2018). Together these benefits may improve welfare considerably, especially as we do not see any significant negative effects of expanding SP enrollments on newborn health.

[32] A 2016 report by Mexico's Federal Consumer Protection Agency cited costs for a vaginal delivery in a private hospital of MXN $22,868–$50,499 and costs of MXN $28,560–$67,099 for a C-section. The report is available at: `https://www.gob.mx/profeco/articulos/el-embarazo-la-espera-tiene-un-costo-34555?idiom=es`. Discounted to 2010, these costs were: MXN$2010: $16,712-36,904 for vaginal and $20,871-49,035 for C-section using the deflator available at: `https://fundar.org.mx/calculadora-deflactor/`. SP's Policy Report (2017) cites lower costs for a vaginal delivery of $8,171MXN (∼$400USD) compared to $14,393MXN (∼$720USD) for a Cesarean. Fees charged in 2024 at an SSA hospital (Instituto Nacional de Perinatología Isidro Espinosa De Los Reyes), which is likely to be informative about fees at SSA before SP, reached up to $MXN 11,868 for a vaginal delivery and $MXN 25,617 for a C-section.

Data Availability

Code replicating the tables and figures as well as information about the proprietary data used in this article in this article can be found in Currie, Hackett and Marquez-Padilla (2026) in the Harvard Dataverse, https://doi.org/10.7910/DVN/72LGLH.

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Tables

Table 1: Summary statistics

	All births				2nd+ births		
	All births Mean	Mom ID Mean	Mom ID, 2+ births Mean	Mom ID, 3+ births Mean	1st SSA Mean	1st private Mean	1st IMSS Mean
Received prenatal care	1.00	1.00	0.97	0.92	0.96	0.98	0.99
Prenatal (1st trim.)	0.76	0.72	0.70	0.55	0.64	0.79	0.78
Adequate prenatal care	0.69	0.65	0.63	0.44	0.55	0.73	0.73
Birth weight (kg)	3.16	3.14	3.20	3.18	3.21	3.16	3.23
Low birth weight (< 2500g)	0.06	0.08	0.04	0.04	0.04	0.04	0.04
Very low birth weight (< 1500g)	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Macrosomic (> 4000g)	0.03	0.04	0.03	0.03	0.04	0.03	0.04
Apgar score	8.88	8.89	8.91	8.90	8.90	8.97	8.91
APGAR < 9	0.09	0.08	0.08	0.08	0.07	0.08	0.08
Weeks gestation	38.83	38.67	38.81	38.89	38.94	38.56	38.77
Premature (< 37 weeks)	0.06	0.07	0.05	0.06	0.05	0.05	0.06
Cesarean delivery	0.47	0.45	0.42	0.15	0.29	0.70	0.45
Private hosp.	0.22	0.21	0.22	0.14	0.06	0.68	0.09
SSA hosp.	0.49	0.53	0.53	0.71	0.82	0.21	0.19
IMSS, other public hosp.	0.28	0.24	0.24	0.12	0.12	0.11	0.73
Home birth	0.01	0.01	0.01	0.02	0.01	0.00	0.00
Baby is female	0.49	0.49	0.49	0.50	0.49	0.49	0.49
Mother's age	25.32	25.58	25.50	23.99	24.39	26.87	26.67
# births	2.07	2.71	2.72	3.65	2.80	2.55	2.61
Completed primary	0.92	0.93	0.93	0.88	0.91	0.96	0.98
Completed secondary	0.72	0.72	0.72	0.54	0.64	0.81	0.85
Completed high school	0.33	0.31	0.30	0.11	0.17	0.47	0.45
Rural municipality	0.19	0.21	0.21	0.26	0.25	0.13	0.18
Observations	11,666,551	935,371	757,546	5,624	403,119	188,382	152,888

Notes: Summary statistics from births data, 2008–2014. Columns correspond to: (1) full public births data from SINAC; (2) full SSA confidential data with mother identifier; (3) data with mother identifier and at least two births observed in data (sample for main models); (4) data with mother identifier and at least three births observed in data (sample for mother FE models); (5)–(7) sample as in (3), conditioned on where first observed birth occurred. Columns (3)–(7) estimated excluding mothers' first observed birth.

Table 2: SMS rollout: fertility and healthcare supply

	Births	Prenatal appt's	Dr. Offices	Doctors	Gynecologists	Pediatricians	Beds (|>1)
SMS (lagged)	-0.005	1.388***	0.002	-0.088	-0.224*	-0.203*	-0.066
	(0.021)	(0.095)	(0.038)	(0.076)	(0.133)	(0.118)	(0.101)
N	14,520	14,520	14,520	14,520	14,520	14,520	4,083
Mean Y	21.33	54.39	13.85	24.29	1.90	2.21	62.91

Notes: Explanatory variable is municipio-level SMS enrollment of 0-4 year olds, $\in [0, 1]$ and is lagged one year. Regressions estimated at the municipio-year level. Births is measured as the number of births per 1,000 inhabitants. Prenatal appointments are the total number of prenatal appointments given in SSA facilities per 1,000 inhabitants in a municipio-year; these data come from SSA clinic consultations data (monthly) and are available from 2010. Doctors' offices, beds, and doctors variables come from the Health Information System data in Mexico, and include information only for SSA facilities. All regressions include municipality and state by year fixed effects, and controls for municipality-year averages of mother's age, number of pregnancies, the probability mothers have a given years of schooling, baby's sex, and an indicator for if the mother is married. All outcomes are log-transformed, using $y' = \log(y + 1)$ to account for zero-valued observations. Reported means are for the variable in levels. Regressions are weighted by the number of observations in the births sample per municipio-year. Standard errors clustered at the municipio level. $^{*}p < 0.1,^{**} p < 0.05,^{***} p < 0.01$.

Table 3: First stage: local SMS rollout predicts individual SP affiliation

Explanatory variable: SMS enrollment	State× yr FE	State× yr FE + Muni TT	Mother FE
Panel A. Full Sample	0.128***	0.128***	0.134***
	(0.039)	(0.039)	(0.050)
N. observations	757,542	757,542	93,706
Mean SP affil: 1st births	0.464	0.464	0.496
First-stage F	10.773	10.641	7.269
Panel B. 1st birth SSA	0.046	0.046	0.035
	(0.047)	(0.047)	(0.062)
N. observations	403,112	403,112	56,785
Mean SP affil: 1st births	0.773	0.773	0.772
First-stage F	0.990	0.964	0.316
Panel C. 1st birth Private	0.221***	0.221***	0.307***
	(0.043)	(0.043)	(0.083)
N. observations	188,374	188,374	20,414
Mean SP affil: 1st births	0.161	0.161	0.221
First-stage F	26.538	26.198	13.844
Panel D. 1st birth IMSS	0.131**	0.130**	0.227**
	(0.058)	(0.058)	(0.103)
N. observations	152,872	152,872	14,303
Mean SP affil: 1st births	0.024	0.024	0.104
First-stage F	5.182	5.090	4.869

Notes: The outcome in all estimates is an indicator for individual mother's affiliation. The first-stage F statistic reported is the excluded F statistic from an IV regression. The first birth is excluded from all regressions, except for the Mother FE model. All regressions include fixed effects for mother's age, number of pregnancies, years of schooling, municipality of residence, month, and year, and control for the baby's sex, spacing since previous birth (in years), and an indicator for if the mother is married. Additional fixed effects in Column order are: (1) state by year fixed effects; (2) state by year fixed effects and municipality time trends; and (3) mother fixed effects with state by year fixed effects. Regressions are weighted by the inverse probability of appearing in the mother population sample. Standard errors clustered at the municipal level. $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$.

Table 4: IV estimates of the effect of SP on the probability of delivering in an SSA hospital

Dependent variable: P(Delivering in SSA)		
	All	1st birth private
SP	0.984***	0.578***
	(0.259)	(0.157)
N	757,542	188,374
Mean Y, 2nd+ births	0.533	0.208

Notes: The outcome in all estimates is an indicator for the second birth occurring in an SSA hospital. Municipio SMS enrollment rate is used as an instrument for the individual mother's enrollment in SP, with affiliation assigned to the municipio of first birth. Each column limits the sample to women whose first birth was in the institution type listed. The first birth is excluded from all regressions. Means reported are for second births, as the condition renders these means trivial for first births. All regressions include (fixed) municipio of residence and state by year fixed effects. All regressions include fixed effects for mother's age, number of pregnancies, years of schooling, and month, and control for the baby's sex, spacing since previous birth (in years), and an indicator for if the mother is married. Regressions are weighted by the inverse probability of appearing in the mother population sample. Standard errors clustered at the municipio level. $^{*}p < 0.1,^{**} p < 0.05,^{***} p < 0.01$.

Table 5: IV estimates of effect of SP on health and utilization

Explanatory variable: 1(Enrolled in SP)

Panel A: Health

	N	LBW	Macrosomic	APGAR < 9	Preterm
Full sample	757,542	0.005	0.050	0.073	0.009
		(0.058)	(0.053)	(0.151)	(0.057)
First birth in private	188,374	-0.059	-0.035	0.101	-0.081
		(0.069)	(0.050)	(0.117)	(0.078)
Mean Y (all)		0.039	0.031	0.098	0.046
Mean Y (priv.)		0.034	0.027	0.102	0.039

Panel B: Utilization

	N	1st Trim.	Adequate	CS
Full sample	757,542	0.014	0.054	0.031
		(0.177)	(0.171)	(0.156)
First birth in private	188,374	0.294*	0.348**	0.238
		(0.175)	(0.178)	(0.166)
Mean Y (all)		0.721	0.652	0.408
Mean Y (priv.)		0.811	0.769	0.722

Notes: Municipality fixed at residence of first birth. SMS enrollment rate as a share of the total population 0–4 years old is used as an instrument for the individual mother's enrollment in SP. The first birth is excluded from all regressions. "Adequate" is a dummy indicating the mother got at least 50% of the recommended number of prenatal appointments according to gestational length. All regressions include fixed effects for mother's age, number of pregnancies, years of schooling, municipality of residence, month, and year by state fixed effects, and control for the baby's sex, spacing since previous birth (in years), and an indicator for if the mother is married. Regressions are weighted by the inverse probability of appearing in the mother population sample. Mean Y reports the mean outcome variable calculated only over first births. Standard errors clustered at the municipality of residence. $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$.

Table 6: Reduced form effect of SMS on incumbent mothers (1st birth SSA)

		Utilization			Health			
	P(SSA)	1st Trim.	Adequate	CS	LBW	Macrosomic	APGAR < 9	Preterm
SMS enrollment	0.143***	-0.003	-0.013	-0.008	0.004	0.008	-0.006	-0.003
	(0.022)	(0.030)	(0.028)	(0.022)	(0.010)	(0.008)	(0.028)	(0.010)
N	403,112	403,112	403,112	403,112	403,112	403,112	403,112	403,112
Mean Y, 1st births	0.998	0.664	0.575	0.266	0.041	0.029	0.086	0.046

Notes: Municipality fixed at residence of first birth. SMS enrollment rate as a share of the total population 0–4 years old is used as the explanatory variable. The first birth is excluded from all regressions. Estimation limited to mothers whose first birth occurred in an SSA hospital. "Adequate" is a dummy indicating the mother got at least 50% of the recommended number of prenatal appointments according to gestational length. All regressions include fixed effects for mother's age, number of pregnancies, years of schooling, municipality of residence, month, and year by state fixed effects, and control for the baby's sex, spacing since previous birth (in years), and an indicator for if the mother is married. Regressions are weighted by the inverse probability of appearing in the mother population sample. Mean Y reports the mean outcome variable calculated only over first births. Standard errors clustered at the municipality of residence. $^{*}p < 0.1,^{**} p < 0.05,^{***} p < 0.01$.

Table 7: Robustness of IV estimates to alternative samples (1st birth in Private)

Panel A: Health					
	N	LBW	Macrosomic	APGAR < 9	Preterm
Full sample	188,374	-0.059	-0.035	0.101	-0.081
		(0.069)	(0.050)	(0.117)	(0.078)
Excluding 15+ appointments	181,959	-0.037	-0.020	0.111	-0.062
		(0.070)	(0.052)	(0.120)	(0.080)
Excl. rural	181,847	-0.067	-0.025	0.087	-0.077
		(0.070)	(0.051)	(0.120)	(0.079)
Excl. 1st premature	185,541	-0.042	-0.031	0.083	-0.073
		(0.066)	(0.050)	(0.114)	(0.076)
Low edu. mothers	35,776	-0.117	-0.182	0.368	-0.098
		(0.164)	(0.148)	(0.301)	(0.169)
Mean Y (priv.)		0.034	0.027	0.102	0.039
Panel B: Utilization					
	N	1st Trim.	Adequate	CS	
Full sample	188,374	0.294*	0.348*	0.238	
		(0.175)	(0.178)	(0.166)	
Excluding 15+ appointments	181,959	0.306*	0.368*	0.224	
		(0.185)	(0.189)	(0.170)	
Excl. rural	181,847	0.255	0.321*	0.190	
		(0.172)	(0.175)	(0.161)	
Excl. 1st premature	185,541	0.260	0.305*	0.246	
		(0.170)	(0.172)	(0.166)	
Low edu. mothers	35,776	0.360	0.228	0.404	
		(0.422)	(0.366)	(0.369)	
Mean Y (priv.)		0.811	0.769	0.722	

Notes: All regressions are estimated on the sample of mothers whose first birth was in a Private facility. Municipality fixed at residence of first birth. SMS enrollment rate as a share of the total population 0–4 years old is used as an instrument for the individual mother's enrollment in SP. The first birth is excluded from all regressions. "Adequate" is a dummy indicating the mother got at least 50% of the recommended number of prenatal appointments according to gestational length. All regressions include fixed effects for mother's age, number of pregnancies, years of schooling, municipality of residence, month, and year by state fixed effects, and control for the baby's sex, spacing since previous birth (in years), and an indicator for if the mother is married. Regressions are weighted by the inverse probability of appearing in the mother population sample. Mean Y reports the mean outcome variable calculated only over first births. The sample is perturbed by: (i) excluding mothers with more than 14 prenatal appointments; (ii) excluding births in the 5% most rural municipios; (iii) excluding mother whose first observed birth was premature; (iv) excluding mothers with more than middle-school. Standard errors clustered at the municipality of residence. $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$.

Figures

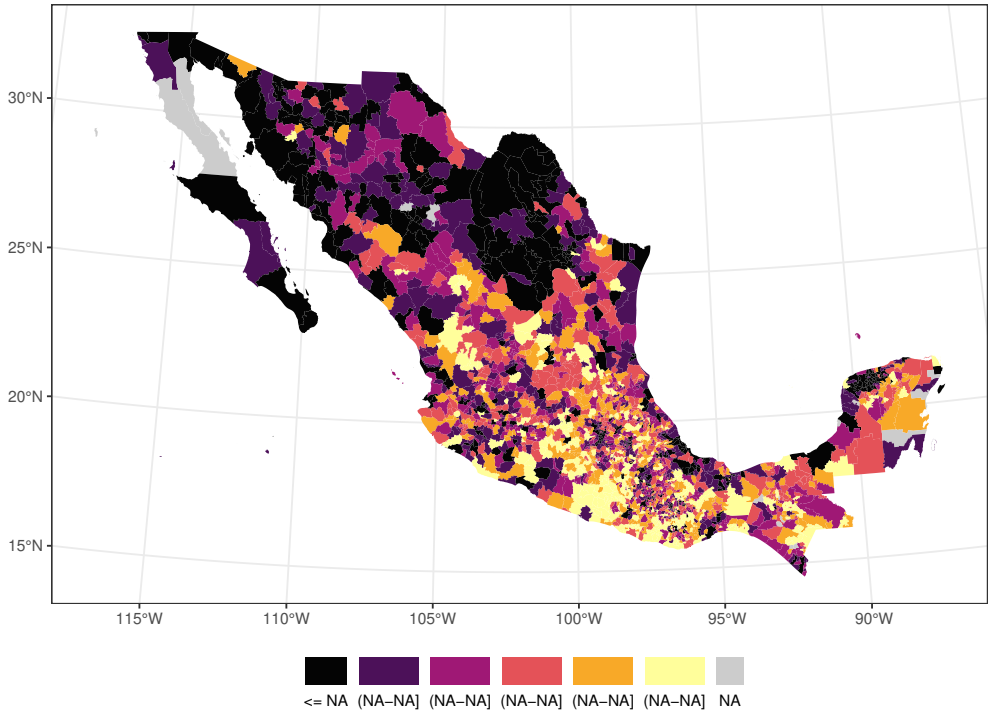


Figure 1: Changes in municipio SMS coverage, 2008–2014

Notes: Change in municipality-level SMS enrollment coverage (per-capita enrollment among children aged 0–4 in 2010) between 2008 and 2014, in percentage points, grouped into sextiles. Mean change = 0.46, median = 0.47. Changes in SMS can be > 1 as the population is fixed for population in 2010. Grey areas indicate missing data.

Alt Text: Heat map of Mexico showing changes in *municipio*-level SMS enrollment coverage between 2008 and 2014, measured in percentage points of per-capita enrollment among children aged 0–4, grouped into six sextiles. Colors range from black (lowest change, $\leq$0.27) through dark purple, magenta, salmon, orange, and light yellow (highest change, 0.62–1.04). Grey municipalities indicate missing data. The northern states show predominantly lower coverage growth (black and dark purple), while central and southern Mexico show more varied and generally higher coverage growth (orange and yellow), although there substantial variation in coverage changes is shown throughout the country.