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Are adolescents as likely as older women to receive immediate post-partum contraception in Mexico?

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ABSTRACT

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The immediate post-partum (PP) period is a crucial opportunity to prevent rapid repeat pregnancy in adolescents. We used 2012 population-based data with a newly available item on PP contraception prior to leaving place of delivery and multivariable methods to test the association of receipt of PP contraception with age and place of delivery in Mexico. Overall, 57% of women received a method (N= 7,156; population N = 10,006,947). Age was not significantly associated with receipt of any PP method, controlling for covariates. Public facilities had lower odds of receipt of a method (OR = 0.57; CI 0.44 – 0.73) compared with employment-based insurance facilities. We estimate 59% of adolescents leave place of delivery with a method, and 55% of all women at public facilities, controlling for all covariates. Adolescents receive PP contraception as often as older women and place of delivery is a key driver of receipt of PP contraception.

INTRODUCTION

Short inter-pregnancy interval is a known risk factor for poor maternal and infant health outcomes worldwide.[1-3] This is true in both high and low fertility countries[4] Adolescent women (<20 years old) are at risk for poor obstetric outcomes[5] and are at high risk of rapid repeat pregnancy, defined as a pregnancy within 2 years of a previous pregnancy.[6] Post-partum contraception is a key strategy to prevent rapid repeat pregnancy,[7] [8,9] a central component of the WHO guidelines on preventing poor reproductive outcomes among adolescents in developing countries,[10] and contributes to achieving Millennium Development Goal (MDG) 5 (improve maternal health) and MDG 4 (reduce child mortality).

To be most effective, post-partum contraception should be provided prior to leaving place of delivery.[6] For many women in low and middle income countries, the next health care encounter may happen with the next pregnancy.[11,12] The traditional approach of waiting to discuss and provide contraception until the 4-8 week post-partum visit may be too late for women of all ages,[13] and adolescents may be at higher risk of loss to follow up.[6] Post-partum contraception is especially important for women with limited access to health services outside of pregnancy and childbirth.[13]

Post-partum sterilization is very common in Mexico,[14] and is a very effective contraceptive method for women who have achieved desired family size. Adolescents and young women, however, may desire more children in the future and need additional contraceptive options. Insertion of an intrauterine device (IUD) prior to discharge is safe and has been studied in diverse cultural and health care settings. [15] Provider and cultural biases, however, persist and may limit the use of IUDs by adolescents and/or immediate insertion following vaginal or cesarean delivery.[6] Previous reports in Mexico suggest that adolescents are at higher risk of leaving place of delivery without contraception. [14]

Reducing adolescent births and the large socio-economic disparities in contraceptive use and maternal morbidity and mortality are priorities in Mexico.[16] National population policy

has long supported access to contraception for all women.[17] Women have access to services through formal employment-based insurance and facilities, called *Seguro Social*; through social insurance for those in the informal sector, called *Seguro Popular*, or via other programs, such as *Oportunidades*, a conditional cash transfer program that targets the poor and is intended to increase use of education and health services. *Seguro Popular*[18] is a health insurance scheme for the poor which guarantees access to a package of 250 essential interventions and 57 costly interventions for catastrophic diseases, including IUDs.[19] In-facility birth is the norm in Mexico,[20] and women deliver in hospitals affiliated with *Seguro Social*; in public, Ministry of Health facilities (*Secretaria de Salud* or SSA); in the private sector; or, more rarely, out-of-facility, with lay midwives (*Parteras*) or family members.

The **purpose** of this analysis is to test whether age at last birth (adolescent versus women 20-29 and 30-49) or place of delivery is associated with post-partum contraceptive uptake, and particularly IUDs. We hypothesized that older women would have higher odds of leaving place of delivery with a contraceptive method and with an IUD in particular, compared with women 12-19, but that odds would not be significantly different by place of delivery (*Seguro Social* or Ministry of Health/SSA).

METHODS

Data and sample

We used the 2012 National Health and Nutrition Survey (Encuesta Nacional de Salud y Nutricion, ENSANUT), a nationally representative survey (at the state level and by rural/urban stratum). ENSANUT has household and individual modules and includes 194,758 individuals (population N=115,170,278). We used the household, adult (20 years and over), and adolescent (12-19) modules. Women who report a live birth in the past 5 years (since 2006) complete a series of questions on obstetric history and outcomes. We included women who were aged 12-49 at the time of last birth in the analysis.

Outcome variables

We focused on two primary binary outcomes: receipt of any modern post-partum contraceptive method prior to leaving place of delivery and receipt of an IUD. We collapsed contraceptive methods into sterilization, IUD/implant, hormonal method, barrier method, or none. We classified open-ended responses into the appropriate categories (e.g. “mirena” classified as IUD, “cut my tubes” classified as sterilization) to capture as much data as possible. We focused on IUD as our second outcome due to the extremely low prevalence of implants in this population (1% of the sample)

Independent variables

Our key independent variables are type of insurance and place of delivery. We grouped women into three groups based on calculated age at last birth (12-19, 20-29, 30-49). Place of delivery was classified as Seguro Social, Ministry of Health/SSA, private, or midwife/home birth.

In Mexico, health facilities are highly correlated with type of insurance; women covered under *Seguro Popular* deliver in hospitals run by the Ministry of Health (*Secretaria de Salud* or *SSA*), while women covered by Seguro Social deliver in Seguro Social hospitals or the private sector. We categorized type of insurance as *Seguro Popular* (public health insurance for the poor), *Seguro Social* (formal sector employment-based insurance), or none.

We examined several household-level variables in our analysis. We classified households as rural (<2500 inhabitants) or not, created an indicator of enrollment in the *Oportunidades* conditional cash transfer program, and whether the household was indigenous, using the Mexican’ government’s preferred definition[21] of whether anyone in the household speaks an indigenous language. We created an indicator of household wealth with an asset index collapsed into deciles. We developed the asset index using factor analysis and based upon household characteristics (e.g. floor and roof material, access to sanitation) and normal goods (meaning ownership is associated with socio-economic status as measured by education; e.g. television, blender, radio, cell phone).[22] The 32 Mexican states were collapsed into six regions by socio-economic level.[23]

We included the woman's level of education (none or primary school, 8th grade (secundaria), more than 8th grade) and insurance (*Seguro Social*, *Seguro Popular*, none). Very few women are exclusively privately insured do we excluded this category from the analysis. Additional individual-level variables focus on health care utilization and obstetric history and outcomes, which may be correlated both with age and uptake of post-partum contraception. We included gravidity as a continuous variable, whether the woman received her first prenatal visit during the first trimester (≤12 weeks), whether 75% of a list of 11 prenatal processes of care were completed, mode of delivery (vaginal, planned cesarean, urgent cesarean), and whether the woman reported any type of complication with delivery.

Analyses

We incorporated survey weights to account for the complex sampling scheme. We report in-sample and population-level descriptive statistics. We developed multivariable regression models for our two outcomes (any post-partum contraception and post-partum IUD) including the variables described above and we report population-level estimates of odds ratios and 95% confidence intervals. We examined effect modification of our age estimate by place of delivery using an interaction term. Finally, we calculated absolute estimates of association using in-sample multivariable predicted probabilities controlling for model covariates.[24]

We performed several sensitivity analyses: we excluded region one, the richest region which only includes Mexico City, DF from analyses; we examined additional interactions (insurance and place of delivery, rural/urban location and place of delivery); and we analyzed subpopulations of rural women and women who were not sterilized following delivery. Our results were robust to all sensitivity analyses and we present only our main models below.

RESULTS

Our sample included 7,156 women (population N = 10,006,947). Nineteen percent of the sample was 12-19 years old at last birth, 55% 20-29 and 26% 30-49 (Table 1). Population-level proportions were slightly different when we used the survey weights; the sampled population is

more disadvantaged (younger, more rural, more indigenous, with lower levels of education, and in lower wealth deciles; Table 1). This makes sense given the stratification scheme by rural status, and supports the use of survey weights in the analysis. The vast majority of our sample delivered in-facility (3% delivered at home or with a lay midwife), and close to half of all deliveries were cesarean (45%). A higher proportion of adolescent women reported having no insurance or *Seguro Popular*, initiating care in the first trimester, delivering at a Ministry of Health/SSA facility, and a (Table 1).

Overall, 57% of women left place of delivery with a contraceptive method. A greater proportion of women ages 12-19 left place of delivery *without* a method of contraception, but the difference was not significant (48% vs 43% women 20-29 and 41% women 30-49; p = 0.05; Figure 1). However, 38% of women 12-19 left place of delivery with a LARC method, which were overwhelmingly IUDs because the population prevalence of implants was 1% (n=75). Sterilization was the most common method for women 30-49 while women 20-29 reported both sterilization and LARC. Both barrier and hormonal methods were rare in this post-partum facility-based sample (Figure 1). A greater proportion of women delivering in Ministry of Health/SSA facilities left without a method (40%) compared with women delivering in *Seguro Social* facilities (27%; Figure 2). An even greater proportion women delivering in private facilities or with a *partera* or at home left with no method (65% and 91% respectively; Figure 2). Method mix among women who received a method was similar at SSA and *Seguro Social* facilities; private facilities rarely provided LARC (Figure 2).

Age was not significantly associated with receipt of any postpartum method, controlling for individual, household, health system and obstetric covariates (Table 2). Adolescents and women 20-29 did not have significantly different odds of receiving an IUD; older women (30-39) had lower odds of receiving an IUD compared with women 12-19. Place of delivery was strongly associated with receipt of a method. Compared with *Seguro Social* facilities, SSA (OR = 0.57; CI 0.44 – 0.73), private (OR = 0.16; CI 0.12 – 0.21), and partera/home (OR = 0.07; CI 0.04 –

0.12) deliveries all had lower odds of receipt of a method (Table 2), and private facilities had significantly lower odds of receipt of an IUD among women receiving a method (OR = 0.21; CI 0.12 – 0.37). Poorer women and rural women had significantly lower odds of receipt of a method. Gravidity and delivery by cesarean were significantly associated with higher odds of receipt of a method, but lower odds of receipt of an IUD.

In-sample multivariable estimates of absolute effect (predicted probabilities; Table 3) indicate that 59% (CI 57%-62%) of adolescents leave place of delivery with a method, controlling for all covariates in Table 3. Seventy-two percent of women who delivery at *Seguro Social* facilities leave with a method, compared with 55% at SSA facilities. Sixty-seven percent of women who deliver by planned cesarean leave with contraception, compared with 51% of women who deliver vaginally. Within women 12-19, the difference between *Seguro Social* and SSA facilities is similar (75%; CI 73%-77% versus 59%; CI 56% - 61%) and significantly different (CIs do not overlap). Within SSA facilities, adolescents have a small but significantly higher probability of leaving with a method (59%; CI 56%-61% versus 56% for women 20-29 and 52% for women 30-49).

DISCUSSION

Contrary to our hypothesis, our data suggest that adolescents are not at higher risk of leaving place of delivery without a method compared with older women, and in fact that post-partum IUD uptake is quite high in adolescents (38%). A previous study using population-based data estimated that 20% of all Mexican women 15-24 used IUDs, and that IUDs were more commonly used than hormonal methods in this age group,[23] but this study did not focus on post-partum provision prior to leaving place of delivery. Misperceptions about the use of IUDs in adolescents[6] may not be as widespread in Mexico, or government efforts to improve access to IUDs by including them on the *Seguro Popular* formulary may play a role.

Over 40% of the population of women who delivered reported leaving place of delivery without a contraceptive method. We would not anticipate the proportion to be 100%; some

women do not desire a contraceptive method or want to become pregnant again quickly, and some women may desire methods not commonly available in the post-partum hospital setting (e.g. hormonal methods). In addition, some of these women may obtain a method at a later post-partum visit, but many women will either not return for a post-partum visit or not receive a method at that visit, making post-partum contraception at the place of delivery important, especially for women with higher risk for loss to follow-up for post-partum care such as adolescents.

Our study contributes to a deeper understanding of clinical and health systems influences on provision of post-partum contraception in Mexico. Previous work has been descriptive[14] or has focused on specific populations.[25] For example, a study at a single *Seguro Social* facility in Mexico reported a 50% uptake of post-partum contraception in-hospital (68% of which were IUDs and 29% sterilization), and identified parity and history of cesarean as significant, positive, correlates with acceptance of a method.[25] Antenatal counseling or intensity of antenatal care has been shown to be associated with contraceptive use in Mexico[26] and in other populations, [27-29] [30] but has also been shown to have no effect.[31] We found that intensity of antenatal care, measured by 75% of recommended processes of care delivered, was significantly associated with any post-partum contraception, but timeliness of prenatal care-accessing care in the first trimester, was not.

Our data suggest that place and mode of delivery are important determinants of immediate post-partum contraception. We found that cesarean delivery was associated with increased odds of receiving contraception, but decreased odds of receiving an IUD among those receiving contraception. This likely reflects the strong culture of post-cesarean sterilization in Mexico. As we seek to reduce cesarean delivery rates, especially preventing first cesareans,[32] we must maintain focus on post-partum contraception. In a context such as Mexico with high cesarean rates[33] and where post-cesarean sterilization is well-accepted, an unintended consequence of reducing untenably high cesarean rates could be reduction in post-

partum contraception. Providers need knowledge and skills to provide long-acting reversible contraception (i.e. IUDs and implants) after both vaginal and cesarean births.

We provide data on all providers in the Mexican health system – public (SSA/Ministry of Health), employment-based (*Seguro Social*), private, and out of facility (*partera*/home). This allows us to take a health systems and population perspective to identify gaps in evidence and vulnerable groups. For example, the private sector is heterogeneous in Mexico and includes high-quality facilities used by the rich as well as poor-quality facilities used by the poor. Regardless of this heterogeneity, we find that private facilities, controlling for patient characteristics, provide a much lower proportion of IUDs than the public and employment-based sectors. Adolescents deliver at nearly equal proportions in the private sector and at *Seguro Social* facilities; the low rates of IUDs at private sector facilities is thus of concern. The public sector (SSA/Ministry of Health), however, provides the majority of obstetric care in Mexico; 60% of adolescents and 48% of women overall delivered in the public sector. In theory, all women have access to IUDs, and hospitals that want to be certified to receive *Seguro Popular* reimbursements must be able to provide them. In addition, the cost-effectiveness of immediate post-partum contraception to public payers has been demonstrated in other populations.[34] More work is needed to understand the barriers to provision of IUDs in the private and public sectors.

We report on immediate post-partum contraception as a proportion of all women reporting deliveries. Most prior work on post-partum contraception has focused on use up to one year[26 35] post-partum, and initiation of contraception may happen too late to prevent rapid repeat pregnancy. In addition, studies that measure post-partum contraception at the time of the follow-up visit miss many women who do not return for care and likely include a biased sample of women.

Our study must be interpreted with the following limitations in mind. First, our study shares the limitations of any study based on self-reported data; however we only include births in the past five years to reduce the probability of recall bias. Second, we do not know about IUD

expulsion or continuation of any method. Previous data from Mexico reported about an 80% continuation rate in an RCT population.[36] Even in a context of high rates of discontinuation, LARC can reduce rapid repeat pregnancy because it offers protection from pregnancy during the period it is used.[6] However, counseling needs to target continuation as well as initiation of methods[6] Third, our results cannot be used to make inference about the private sector in Mexico, nor is our measure of private synonymous with quality. Our variable includes expensive private hospitals, non-profit or NGO facilities, and independent facilities of unknown quality. More work is needed to understand the quality and outcomes around post-partum contraception in the private sector in Mexico. Fourth, we do not know about the content or quality of counseling that occurs at facilities included in our study. We have weak evidence about post-partum contraceptive educational interventions.[37] Poor or minority women in the US have reported poor communication with providers or feeling coerced;[38] it is unknown whether this also occurs in Mexico. Finally, this is a cross-sectional study. It will be important to track changes in post-partum contraception over time in specific at-risk populations identified in our study (e.g. rural and poor women). The 2012 survey is the first time this question was asked and we were therefore unable to compare our results with prior years.

We find that adolescents are not at higher risk of leaving place of delivery without a contraceptive method than older women, and that adolescents are able to access IUDs in similar proportions as women 20-29. Our data suggest that place and mode of delivery are important determinants of immediate post-partum contraception for all women. Employment-based insurance facilities (*Seguro Social*) appear to provide the best access to post-partum contraception, compared with the public and private sectors.

REFERENCES

1. Merrick TW. Maternal-neonatal health (MNH) and poverty: Factors beyond care that affect MNH outcomes. Washington DC: World Bank Institute; 2005.
2. Zhu BP, Rolfs RT, Nangle BE, Horan JM. Effect of the interval between pregnancies on perinatal outcomes. N Engl J Med 1999;340:589-94.
3. Conde-Agudelo A, Rosas-Bermudez A, Kafury-Goeta AC. Birth spacing and risk of adverse perinatal outcomes: a meta-analysis. JAMA 2006;295:1809-23.
4. World Health Organization. World health report: 2005: Make every mother count: Geneva: WHO; 2005.
5. Ganchimeg T, Ota E, Morisaki N, et al. Pregnancy and childbirth outcomes among adolescent mothers: a World Health Organization multicountry study. BJOG: An International Journal of Obstetrics & Gynaecology 2014;121:40-8.
6. Baldwin MK, Edelman AB. The effect of long-acting reversible contraception on rapid repeat pregnancy in adolescents: a review. J Adolesc Health 2013;52:S47-53.
7. Thiel de Bocanegra H, Chang R, Menz M, Howell M, Darney P. Postpartum contraception in publicly-funded programs and interpregnancy intervals. Obstet Gynecol 2013;122:296-303.
8. Damle LF, Gohari AC, McEvoy AK, Desale SY, Gomez-Lobo V. Early initiation of postpartum contraception: Does is decrease rapid repeat pregnancy in adolescents? J Pediatr Adolesc Gynecol 2014;In press.
9. Thiel de Bocanegra H, Chang R, Howell M, Darney P. Interpregnancy intervals: impact of postpartum contraceptive effectiveness and coverage. Am J Obstet Gynecol 2014;210:311.e1-.e8.
10. Chandra-Mouli V, Camacho AV, Michaud PA. WHO guidelines on preventing early pregnancy and poor reproductive outcomes among adolescents in developing countries. J Adolesc Health 2013;52:517-22.
11. Moran C, Fuentes G, Amado F, Higareda H, Bailon R, Zarate A. [Postpartum contraceptive practice in hospitals of the Federal District]. Salud Publica Mex 1992;34:18-24.
12. Speroff L, Mishell DR, Jr. The postpartum visit: it's time for a change in order to optimally initiate contraception. Contraception 2008;78:90-8.
13. Levi E, Cantillo E, Ades V, Banks E, Murthy A. Immediate postplacental IUD insertion at cesarean delivery: a prospective cohort study. Contraception 2012;86:102-5.
14. Allen-Leigh B, Villalobos-Hernandez A, Hernandez-Serrato MI, et al. [Use of contraception and family planning in adolescent and adult women in Mexico]. Salud Publica Mex 2013;55 Suppl 2:S235-40.
15. Grimes DA, Lopez LM, Schulz KF, Van Vliet HA, Stanwood NL. Immediate post-partum insertion of intrauterine devices. The Cochrane database of systematic reviews 2010:CD003036.
16. Frenk J, Gomez-Dantes O, Langer A. A comprehensive approach to women's health: Lessons from the Mexican health reform. BMC Women's Health 2012;12:42.
17. Consejo Nacional de Poblacion. Programa nacional de poblacion 2008-2012. Por un cambio demografico a favor del desarrollo. Mexico, DF: CONAPO; 2008.

18. Frenk J, Gonzalez-Pier E, Gomez-Dantes O, Lezana MA, Knaul FM. Comprehensive reform to improve health system performance in Mexico. Lancet 2006;368:1524-34.
19. Seguro Popular. Carta de derechos y obligaciones de los afiliados. 2009. (Accessed June 7, 2012, at http://www.seguro-popular.salud.gob.mx/images/contenidos/Afiliacion/sp_carta_derechos_obligaciones_formato_lectura.pdf.)
20. Lazcano-Ponce E, Schiavon-Ermani R, Uribe-Zuniga P, et al. Cobertura de atencion del parto en Mexico. Su interpretacion en el contexto de la mortalidad materna. Salud Publica Mex 2013;55:S214-S24.
21. Indicadores y estadisticas. 2012. (Accessed June 1, 2012, at http://www.cdi.gob.mx/index.php?option=com_content&view=category&id=38&Itemid=54.)
22. Darney BG, Weaver M, Sosa-Rubi SG, et al. The Oportunidades Conditional Cash Transfer Program: Effects on Pregnancy and Contraceptive Use Among Young Rural Women in Mexico. International Perspectives on Sexual and Reproductive Health 2013;39:205-17.
23. Juarez F, Luis Palma J, Singh S, Bankole A. Las necesidades de salud sexual y reproductiva de las adolescentes en Mexico: Retos y oportunidades. New York: Guttmacher Institute; 2010 January.
24. Tomz M, Wittenberg J, King G. CLARIFY: Software for interpreting and presenting statistical results. Journal of Statistical Software 2003;8:1-30.
25. Romero-Gutierrez G, Garcia-Vazquez MG, Huerta-Vargas LF, Ponce-Ponce de Leon AL. Postpartum contraceptive acceptance in Leon, Mexico: a multivariate analysis. The European Journal of Contraception and Reproductive Health Care 2009;8:210-6.
26. Barber SL. Family planning advice and postpartum contraceptive use among low-income women in Mexico. International family planning perspectives 2007;33:6-12.
27. Adanikin AI, Onwudiegwu U, Loto OM. Influence of multiple antenatal counselling sessions on modern contraceptive uptake in Nigeria. Eur J Contracept Reprod Health Care 2013;18:381-7.
28. Do M, Hotchkiss D. Relationships between antenatal and postnatal care and post-partum modern contraceptive use: evidence from population surveys in Kenya and Zambia. BMC Health Serv Res 2013;13:6.
29. Hernandez LE, Sappenfield WM, Goodman D, Pooler J. Is effective contraceptive use conceived prenatally in Florida? The association between prenatal contraceptive counseling and postpartum contraceptive use. Matern Child Health J 2012;16:423-9.
30. Zapata LB, Murtaza S, Whiteman MK, et al. Contraceptive counseling and postpartum contraceptive use. Am J Obstet Gynecol 2014;211:In press.
31. Akman M, Tuzun S, Uzuner A, Basgul A, Kavak Z. The influence of prenatal counselling on postpartum contraceptive choice. J Int Med Res 2010;38:1243-9.
32. Spong CY, Berghella V, Wenstrom KD, Mercer BM, Saade GR. Preventing the first cesarean delivery. Summary of a joint Eunice Kennedy Shriver National Institute of Child Health and Human Development, Society for Maternal-Fetal Medicine, and American College of Obstretricians and Gynecologists workshop. Obstet Gynecol 2012;120:1181-93.

33. Heredia-Pi I, Servan-Mori EE, Wirtz VJ, Avila-Burgos L, Lozano R. Obstetric Care and Method of Delivery in Mexico: Results from the 2012 National Health and Nutrition Survey. PLoS ONE 2014;9:e104166.
34. Rodriguez MI, Jensen JT, Darney PD, Little SE, Caughey AB. The financial effects of expanding postpartum contraception for new immigrants. Obstet Gynecol 2010;115:552-8.
35. Thapa S, Kumar S, Cushing J, Kennedy K. Contraceptive use among postpartum women: Recent patterns and programmatic implications. International family planning perspectives 1992;18:83-92.
36. Lara Ricalde R, Menocal Tobias G, Ramos Perez C, Velazquez Ramirez N. [Random comparative study between intrauterine device Multiload Cu375 and TCu 380a inserted in the postpartum period]. Ginecol Obstet Mex 2006;74:306-11.
37. Lopez LM, Hiller JE, Grimes DA, Chen M. Education for contraceptive use by women after childbirth. The Cochrane database of systematic reviews 2012;8:CD001863.
38. Yee LM, Simon MA. Perceptions of coercion, discrimination and other negative experiences in postpartum contraceptive counseling for low-income minority women. J Health Care Poor Underserved 2011;22:1387-400.

Table 1. Sample characteristics by age, women who delivered a live birth in the past 5 years, ENSANUT 2012

	Overall		12-19		20-29		30-39			
	Sample n	Population estimate	Sample n	Population estimate	Sample n	Population estimate	Sample n	Population estimate	Chi-square for sample estimates	pearson chisq - pop sample
	7,156	10,006,947	1,526	1,940,838	3,492	5,458,749	2,138	2,607,361		
	100% n (%)	100% %	21% n(%)	19% %	49% n(%)	55% %	30% n(%)	26% %		
Socio-demographic variables										
Indigenous household	929 (13.0)	10.0	183 (12.0)	8.8	430 (12.3)	9.3	316 (14.8)	12.2	0.012	0.0132
Oportunidades household	1923 (26.9)	21.3	322 (21.1)	19.9	877 (25.1)	19.4	724 (33.9)	26.2	0.000	0.0001
Rural household	2484 (34.7)	23.5	534 (35.0)	25.4	1197 (34.3)	23.1	753 (35.2)	23.0	0.746	0.30
Education completed										
None/primary	2204 (30.8)	25.6	328 (21.5)	17.6	1009 (28.9)	24.0	867 (40.6)	34.8	0.000	0.0000
Secundaria	3001 (41.9)	40.6	820 (53.7)	52.6	1421 (40.7)	38.4	760 (35.6)	36.3		
Above secundaria	1951 (27.3)	33.8	378 (24.8)	30.0	1062 (30.4)	37.6	511 (23.9)	28.9		
Household wealth decile (1-2 = poorest)										
1-2	1838 (25.8)	19.1	449 (29.5)	21.8	884 (25.4)	18.8	505 (23.7)	17.7	0.000	0.0210
3-4	1577 (22.1)	20.0	367 (24.1)	21.4	806 (23.1)	20.8	404 (18.9)	17.2		
5+	3724 (52.2)	60.7	705 (46.4)	56.6	1795 (51.5)	60.3	1224 (57.4)	64.5		
State grouped by socio-economic region (1=richest)										
1	171 (2.8)	6.7	43 (2.8)	6.1	62 (1.8)	5.5	66 (3.1)	9.5	0.001	0.0328
2	2309 (32.3)	39.4	546 (25.8)	41.5	1103 (31.6)	40.2	660 (30.9)	36.0		
3	1274 (17.8)	9.5	274 (18.0)	10.2	636 (18.2)	9.8	364 (17.0)	8.4		
4	2125 (29.7)	23.9	427 (28.0)	22.3	1038 (29.7)	23.7	660 (30.9)	25.5		
5	437 (6.1)	9.2	88 (5.8)	9.3	227 (6.5)	9.4	122 (5.7)	8.6		
6	840 (11.7)	11.5	148 (9.7)	10.5	426 (12.2)	11.5	266 (12.4)	12.0		
Health system utilization variables										
Insurance										
Seguro Popular	3949 (55.2)	48.2	909 (59.6)	50.5	1902 (54.5)	47.9	1138 (53.2)	47.1	<.0001	0.0000
Seguro Social	2011 (28.1)	29.9	290 (19.0)	20.6	1008 (28.9)	29.8	713 (33.4)	38.8		
None	1196 (16.7)	21.9	327 (21.4)	28.8	582 (16.7)	22.2	287 (13.4)	16.1		
Prenatal care initiated in the 1st trimester	2737 (39.4)	37.8	799 (54.3)	48.0	1209 (35.4)	34.1	729 (35.4)	38.1	0.000	0.0000
75% of prenatal processes of care completed	5774 (80.7)	79.3	1214 (79.6)	77.3	2800 (80.2)	78.9	1760 (82.3)	81.7	=0.064	0.13
Place of delivery										
Seguro Social	1917 (26.8)	27.8	280 (18.4)	20.0	1024 (29.3)	29.9	613 (28.7)	29.4	<.0001	0.0000
SSA (Ministry of Health)	3818 (53.4)	48.1	1030 (67.5)	60.5	1775 (50.8)	46.4	1013 (47.4)	42.6		
Private	1084 (15.2)	20.8	171 (11.2)	17.5	519 (14.9)	20.5	394 (18.4)	24.1		
Partera/home	337 (4.7)	3.2	45 (3.0)	2.1	174 (5.0)	3.3	118 (5.5)	4.0		
Obstetric variables										

Gravidity (mean;CI)	2.76 (2.72 - 2.80)	2.5 (2.5 - 2.6)	1.49 (1.46 - 1.53)	1.5 (1.5 - 1.6)	2.61 (2.56 - 2.65)	2.4 (2.4 - 2.5)	3.9 (3.82 - 3.99)	3.6 (3.5 - 3.7)		
Mode of delivery										
Vaginal	4163 (58.2)	54.5	953 (62.5)	61.8	2083 (59.7)	55.3	1127 (52.7)	47.3	0.000	0
Urgent Cesarean	1722 (24.1)	25.4	408 (26.7)	26.9	833 (23.9)	26.3	481 (22.5)	22.5		
Planned Cesarean	1270 (17.6)	20.1	165 (10.8)	11.3	575 (16.5)	18.4	530 (24.8)	20.1		
Any complication with delivery	1307 (18.7)	19.6	274 (18.2)	17.6	634 (18.5)	20.8	399 (19.3)	18.4	0.684	0.0134

Note: n=5 women were missing data on age and n=47 women were missing data on post-partum contraception and excluded from analysis. Women 12-19 were not more likely to be missing data than older women (data not shown)

SSA: Secretaria de Salud; Partera = midwife

Figure 1

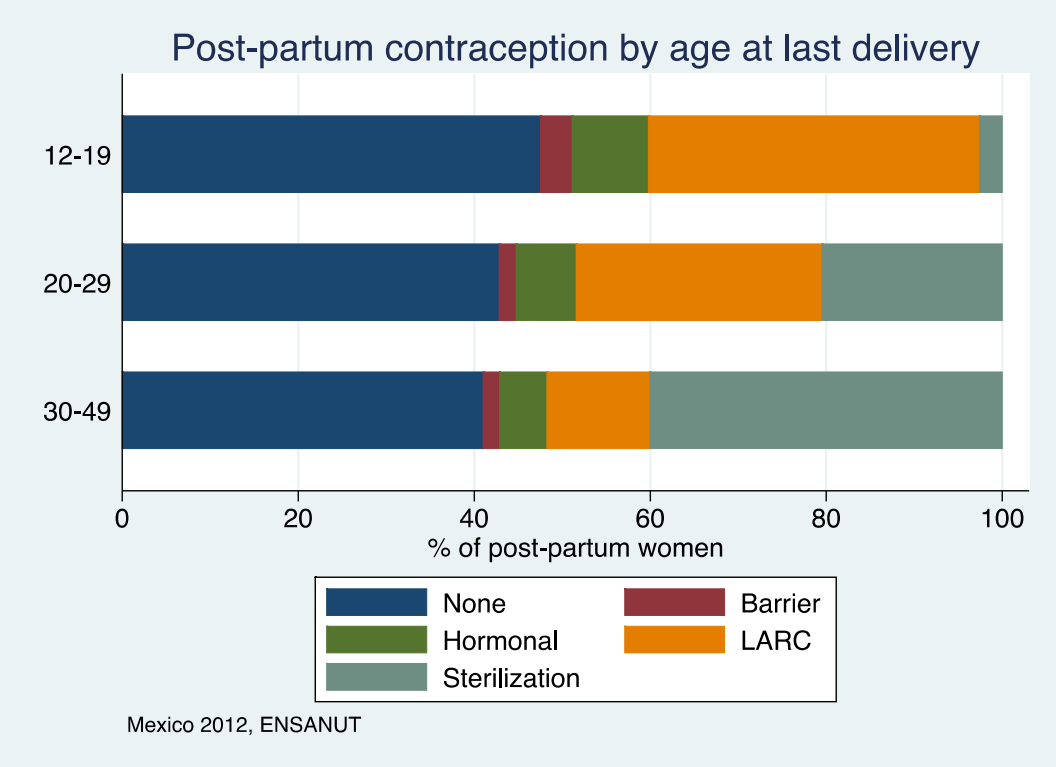

Figure 2

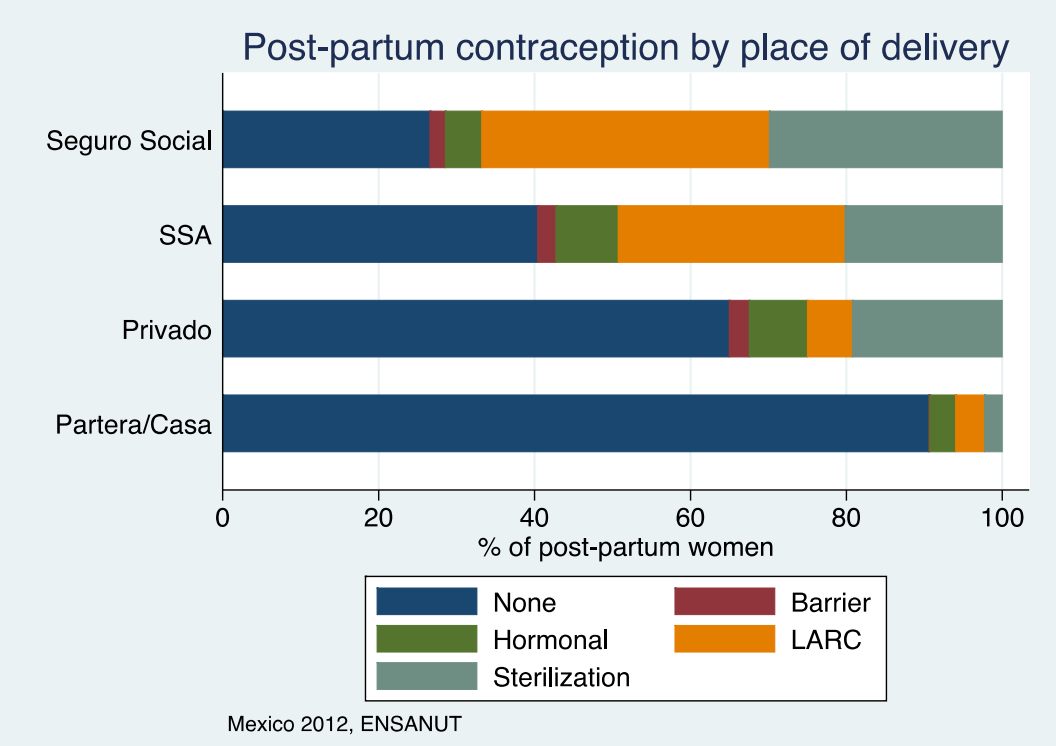

Table 2. Association of receipt of any post-partum contraception or IUD prior to discharge and age, insurance, and place of delivery. Population estimates, ENSANUT 2012, Mexico

	Any contraception		IUD among those receiving contraception	
model n	6920		3856	
Population N	9,755,484		5,576,567	
	OR	95% CI	OR	95% CI
Age at last birth (12-19 is referent)				
20-29	1.03	0.82 - 1.30	0.71	0.51 - 1.00
30-49	0.91	0.67 - 1.24	0.35	0.23 - 0.54
Indigenous household	1.03	0.78 - 1.37	0.88	0.60- 1.27
Oportunidades household	0.91	0.74 - 1.12	1.02	0.76 - 1.36
Rural household	**0.73**	**0.61 - 0.89**	0.92	0.72 - 1.18
Education completed (none/primary is referent)				
Secundaria	1.20	0.96 - 1.50	0.94	0.71 - 1.26
Above secundaria	1.16	0.91 - 1.48	1.13	0.82 - 1.59
Household wealth decile (1-2, poorest, is referent)				
3-4	1.03	0.81 - 1.31	0.85	0.61 - 1.19
5+	0.92	0.71 - 1.19	0.75	0.54 - 1.04
Socio-economic region (1, richest, is referent)				
2	1.03	0.68 - 1.57	0.80	0.40 - 1.58
3	0.90	0.58 - 1.37	0.74	0.37 - 1.48
4	0.98	0.65 - 1.48	0.87	0.45 - 1.72
5	1.42	0.87 - 2.32	0.56	0.26 - 1.17
6	**0.53**	**0.34 - 0.83**	0.62	0.28 - 1.37
Gravidity	**1.24**	**1.16 - 1.33**	**0.58**	**0.51 - 0.66**
Insurance (None is referent)				
Seguro Popular	0.97	0.76 - 1.24	0.80	0.57 - 1.11
Seguro Social	0.89	0.69 - 1.17	0.75	0.54 - 1.04
First prenatal vist at <=12 weeks	1.11	0.95 - 1.31	1.13	0.90 - 1.42
75% of prenatal processes of care completed	**1.36**	**1.10 - 1.69**	0.96	0.67 - 1.39
Mode of delivery (Vaginal is referent)				
Urgent Cesarean	**1.50**	**1.23 - 1.83**	**0.42**	**0.31 - 0.55**
Planned Cesarean	**1.99**	**1.56 - 2.54**	**0.36**	**0.28 - 0.48**
Any complication with delivery	1.00	0.82 - 1.22	0.98	0.71 - 1.35
Place of delivery (Seg. Social is referent)				
SSA (Ministry of Health)	**0.57**	**0.44 - 0.73**	0.80	0.58 - 1.09
Private	**0.16**	**0.12 - 0.21**	**0.21**	**0.12 - 0.37**
Lay midwife/home	**0.07**	**0.04 - 0.12**	0.25	0.06 - 1.10

Note. Model incorporates survey weights

Table 3. Multivariable predicted probabilities of contraception prior to discharge

	prob	CI
Age		
12-19	0.594	0.569 - 0.620
20-29	0.563	0.551 - 0.575
30-49	0.531	0.507 - 0.552
Place of delivery		
Seguro Social	0.721	0.703 - 0.738
SSA (MoH)	0.552	0.540 - 0.565
Private	0.372	0.349 - 0.394
Home	0.221	0.192 - 0.249
Mode of delivery		
Vaginal	0.512	0.500 - 0.523
Urgent cesarean	0.591	0.578 - 0.605
Planned cesarean	0.667	0.642 - 0.688
Among adolescents (by place of delivery)		
Place of delivery		
Seguro Social	0.748	0.726 - 0.772
SSA (MoH)	0.587	0.561 - 0.613
Private	0.405	0.372 - 0.438
Home	0.246	0.211 - 0.282
Within SSA facilites (by age)		
12-19	0.587	0.561 - 0.613
20-29	0.555	0.543 - 0.568
30-49	0.523	0.499 - 0.545

Note. Probabilites are predicted for varaibles listed with all other variables in Table 2 held at the mean.