Contraceptive use among first-trimester abortion patients compared with post-partum and community dwelling women in Mexico

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ABSTRACT (150 word limit)

The purpose of this study was to compare use of any modern method and method tier between first trimester abortion patients from Mexico City's Interrupcion Legal de Embarazo, or ILE, program, post-partum, and community-dwelling women. We conducted a retrospective secondary analysis, leveraging three data sources (ILE clinical records and two population-based surveys). We used coarsened exact matching, logistic regression, and calculated multivariable probabilities. Our matched multivariable results suggest that contraceptive use is slightly higher among ILE patients (63.6%; CI 63.2 - 64.1%) than community-dwelling women (60.6%; CI 59.5 - 61.8%) and post-partum women (58.1%; CI 55.3 – 60.9%). When we excluded sterilization, which is a method not available in the ILE program, post-partum women have a lower probability of using contraception than ILE patients (49.4%; CI 45.9 – 52.8% compared with 64.2%; CI 63.7 – 64.6%). The ILE program provides access to contraception on par with post-partum and community health services in Mexico.

INTRODUCTION

In Mexico, a middle-income country, total fertility has dropped dramatically over the past several decades (CITE) and contraceptive prevalence is relatively high [1]. Government population policy endorses wide access to a range of modern contraceptive methods, but evidence suggests that much contraception, especially for younger women, is tied to delivery – immediate post-partum contraception.[2,3]

Contraceptive counseling and provision is an essential component of abortion services to enable women to avoid future unintended pregnancies[4]. Contraceptive counseling and provision is integrated into Mexico City's public first trimester abortion program, Interrupcion Legal de Emabrazo (ILE). However, it is not known whether contraceptive uptake among abortion patients is different from that of post-partum women who have delivered a live birth in a health facility[2] or community dwelling women who have experienced pregnancy (as a proxy for sexual activity). Evaluating contraceptive provision in abortion services in a vacuum makes it difficult to gauge where there may be room for improvement compared to obstetric services or broader community or population-based programs.

The purpose of this study was to compare use of any modern method and method tier between ILE, post-partum, and community-dwelling women. These results can be used to improve contraceptive policies and programs for women at risk of unintended pregnancy. We hypothesized that the three populations would have similar proportions of contraceptive use.

METHODS

We conducted a retrospective secondary analysis, leveraging three data sources to form our three groups: clinical data extracted from paper medical charts in the ILE program - abortion patient population - and two population-based data sources that represent

community-dwelling and post-partum populations. We restricted each sample and created a matched dataset to make the three populations more comparable, described below. The ILE dataset contains information from four high-volume public first-trimester abortion facilities. Details of the data are described elsewhere [5,6]. We restricted the sample to women who reside in Mexico City and States of Mexico, Jalisco, and Nuevo Leon (95.3% of the total sample).

We pooled three waves (2006, 20009, 2014) of the Encuesta Nacional de Dinamica Demografica/National Survey of Demographic Dynamics (ENADID) for our community-dwelling sample. ENADID is a nationally representative survey employing two-stage stratified probability sampling from Mexico's 31 states and Mexico City [7]. We restricted our sample to women who had experienced at least one pregnancy (as a proxy for risk for future pregnancy), who were not pregnant at the time of the survey, not sterilized, and that live in urban (=>100,000 residents) areas of Mexico City, Mexico State, Jalisco, and Nuevo Leon.

We also used the most recent Encuesta Nacional de Salud y Nutricion/National Health and Nutrition Survey (ENSANUT), from 2012, for our post-partum sample. ENSANUT is representative at the state level and by rural/urban stratum [8]. We included women who reported a live birth in the past 5 years who are asked a series of questions about that birth, not currently pregnant, and live in urban (=>100,000 residents) areas of Mexico City, Mexico State, Jalisco and Nuevo Leon.

Our outcomes are use of any modern contraceptive method and CDC/WHO tier [9] of method used (among those who report using a method). Tier 1 includes sterilization, and long-acting reversible methods; Tier 2 most hormonal methods, and Tier 3 barrier methods. Contraceptive use and method type is self-report in ENADID and ENSANUT. In the ILE data, we drew from the social work or physician note. Those charts missing contraceptive method information were coded as not using a method. Our key independent variable is

population: whether the observation came from the ILE (abortion patient), ENADID (community dwelling), or ENSANUT (post-partum) population. We also included age (<18, 18-19, 20-24, 25-29, 30-39, 40-54 years old), education (highest level achieved: primary, junior high school, high school, university or higher), state of residence (CDMX, Mexico State, Nuevo Leon and Jalisco), marital status (married or cohabitating, widow, divorce or separated and single) and number of previous births (none, one and two or more).

We used descriptive and bivariate statistics to characterize the sample, examine differences in covariate distributions across the three data sources, and test the association of our outcomes with population (abortion patient, community dwelling, post-partum).

We developed naïve logistic regression models to compare ILE to ENADID and ILE to ENSANUT. We used two models so we could compare these naïve models to matched models that require two groups (treatment and comparison). All models included all covariates described above. The independent variable for first comparison was whether women belonged to ILE dataset or ENADID (value of 1 for ILE, 0 ENADID). For the second comparison the independent variable of interest was whether women belonged to ILE dataset or ENSANUT (value of 1 ILE, 0 ENSANUT).

After the naïve models we used coarsened exact matching (CEM)[10], a non-parametric data pre-processing matching method, to improve the balance between our groups. We specified variables for matching as follows: for births, a categorical variable, we used 3 groups; for age we specified three groups; less than 20 years old, 20 to 30 and older than 30 years old; education, state of residence, marital status were coarsened to binary variables. We next used logistic regression on the matched sample, using original variable categories.

We estimated several other matching and weighting methods as sensitivity analyses. We estimated propensity scores with 1 neighbor and 0.001 as the maximum

propensity score distance of controls (caliper) followed by logistic regressions (ILE vs ENADID and ILE vs ENSANUT) weighted by the propensity scores. We employed entropy balancing (ebalance) which involves a reweighting scheme that directly incorporates covariate balance into the weight function that is applied to the simple units [11]. This ebalance model was specified with all covariates. We also restricted the sample to Mexico City only as a sensitivity analysis; results were similar so we present the larger sample.

We performed the whole previous process (naïve model, CEM, additional matching) again, this time excluding women who received sterilization as their postpartum method in ENSANUT, since sterilization is not available in the ILE program.

We undertook the above for both outcomes: use of any modern method and method Tier (*multivariable method Tier results pending*).

Finally, we calculated absolute margins or multivariable predicted probabilities for each model (ILE vs ENADID, ILE vs ENSANUT and ILE vs ENSANUT without sterilized women) to ease interpretation of estimates.

RESULTS

After exclusions, our final sample included 52,498 women from the ILE program, 7,527 from ENADID and 1,234 from ENSANUT. Table 1 shows the sample characteristics of the full sample and highlights the differences between the samples. Women in the ILE program are younger, more educated, have lower parity, and are more likely to be single.

Crude proportions of use of any modern contraceptive method is different by population (Figure 1): 63.4% among ILE patients, 55.7% among the general community dwelling population (ENADID), and 63.0% among the post-partum sample (ENSANUT).

Logistic models using the full samples (Tables 2a and 2b) suggest that contraceptive use is higher among ILE patients (absolute margin 63.2%; CI 62.8 - 63.7%) than community-dwelling women (60.1%; CI 58.9 - 61.4%) and that there is not statistically significant difference with post-partum women. When we excluded sterilization, which is

not available in the ILE program, post-partum women have a lower probability of using contraception than ILE patients (63.9%; CI 63.5 – 64.3% vs 47.4%; CI 43.8 – 50.9%).

Matched multivariable results (CEM model; Tables 2a and 2b) support the naïve model: contraceptive use is slightly higher among ILE patients (63.6%; CI 63.2 - 64.1%) than community-dwelling women (60.6%; CI 59.5 - 61.8%) and also higher than post-partum women (64.1%; CI 63.3%-64.5% vs 58.1%; CI 55.3 – 60.9%). When we excluded sterilization, post-partum women have a lower probability of using contraception than among ILE patients (64.2%; CI 63.7 – 64.6% vs 49.4%; CI 45.9 – 52.8%).

One of our sensitivity analyses was a logistic regressions weighted by propensity scores, this approach suggested that there is no statistically significant differences in contraceptive use between ILE patients and community-dwelling women and between ILE patients and post-partum women. However, the absolute probabilities estimates were quite similar. The entropy balancing model returned similar results.

Looking at method tier among women who use a modern method (Figure 2), nearly all post-partum women who use a modern method use a Tier 1 method (91.8%), followed by the community-dwelling sample (55.4%), then the ILE sample (49.1%).

Multivariable results for contraceptive Tier are underway/pending.

Table 1. Sample Characteristics: full sample

Figure 1. Contraception use by population group

Figure 2. Tier by population group

Table 2a & 2b. Multivariable absolute margins, any contraceptive use

PENDING: multivariable results: method Tier

Table 1. Sample Characteristics: full sample

Covariate distributions	ILE ^ (N=52,498)	ENADID* (N=7,527)	ENSANUT 2012ª (N=1,234)	χ^2 p-value + (ILE vs ENADID)	χ^2 p-value + (ILE vs ENSANUT)
Age					
<18	8.73	0.84	1.05	**0.000**	**0.000**
18-19	12.38	2.58	3.48	**0.000**	**0.000**
20-24	35.06	13.02	6.56	**0.000**	**0.000**
25-29	21.12	16.43	10.94	**0.000**	**0.000**
30-39	19.8	34.67	41.57	**0.000**	**0.000**
40-54	2.73	32.46	35.38	**0.000**	**0.000**
Missing of age	0.17	0.00	0.00	**0.000**	0.145
Education					
Primary	8.62	15.73	25.12	**0.000**	**0.000**
Secundary	33.21	34.38	37.2	**0.043**	**0.003**
High school	38.19	29.84	24.31	**0.000**	**0.000**
University	15.59	19.98	13.37	**0.000**	**0.034**
Missingof education	4.39	0.07	0.00	**0.000**	**0.000**
State					
CDMX (9)	74.62	38.73	31.2	**0.000**	**0.000**
Mex (15)	24.93	16.92	23.82	**0.000**	0.376
Jalisco (14)	0.39	20.84	18.23	**0.000**	**0.000**
Nuevo Léon (19)	0.06	23.50	26.74	**0.000**	**0.000**
Missingof state	0.00	0.00	0.00	---	---
Civil status					
Free union/married	49.50	74.25	73.01	**0.000**	**0.000**
widow/divorced/separated	5.22	15.28	18.31	**0.000**	**0.000**
Single	41.50	10.47	8.67	**0.000**	**0.000**
Missing of civil status	3.77	0.00	0.00	**0.000**	**0.000**
Births	1.13 [1.12 - 1.14]	2.00 [1.98 - 2.03]	2.59 [2.51 - 2.67]	**0.000**	**0.000**
None	39.44	2.16	0.00	**0.000**	**0.000**
One	24.63	34.94	21.96	**0.000**	**0.031**
Two or more	32.47	62.89	78.04	**0.000**	**0.000**
Missing of births	3.45	0.00	0.00	**0.000**	**0.000**

^Women of the ILE program who live in CDMX, Edo Mex, Jalisco and Nuevo León

*Women who have ever been pregnant, not currently pregnant, no sterilized, who live in areas with 100,000 or more residents of CDMX, Jalisco, Edo Mex or NL and that know at least one contraceptive method and that have used one, but OTB

ªNot currently pregnant women with at least one live child who live in areas with 100,000 or more residents of CDMS, Jalisco, Edo Mex and NL

+Chi-squared for group differences

Figure 1. Any contraception use by population group (crude proportions)

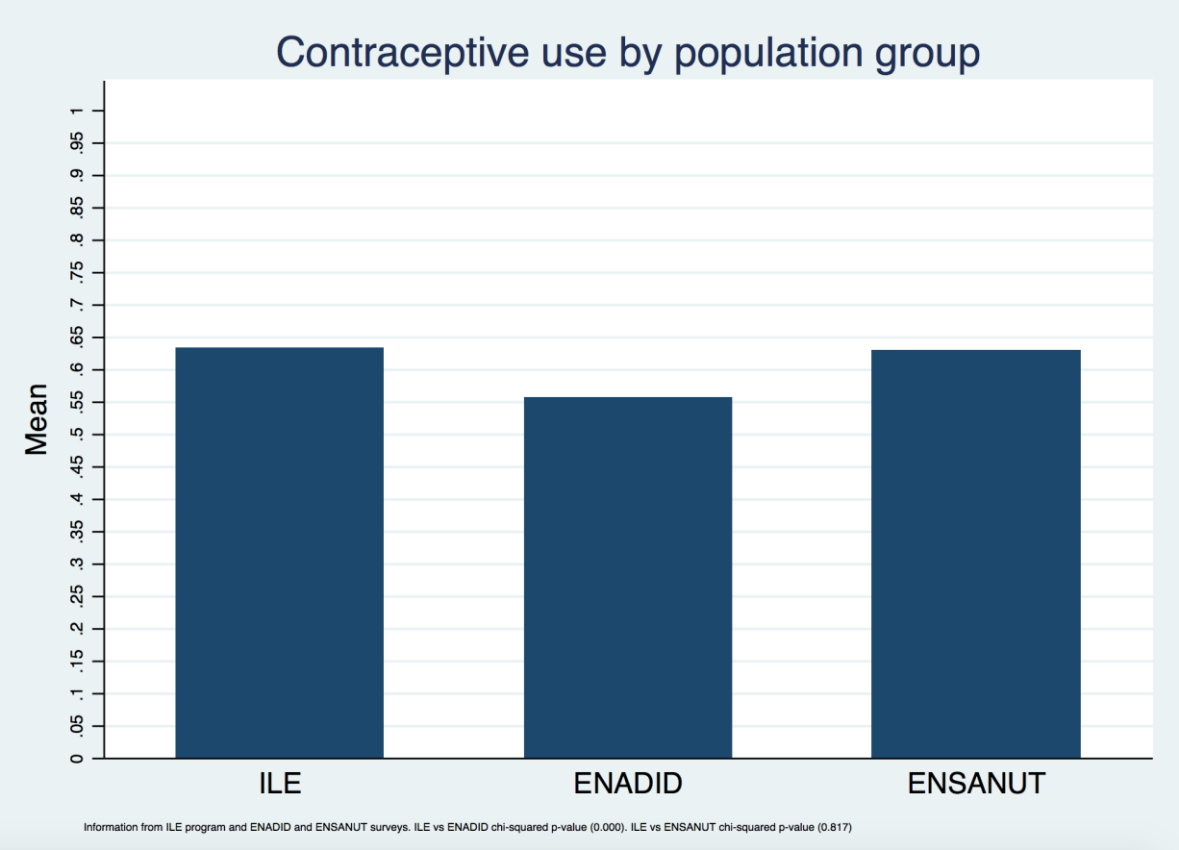

Figure 2. Tier by population group, among those using a method (crude proportions)

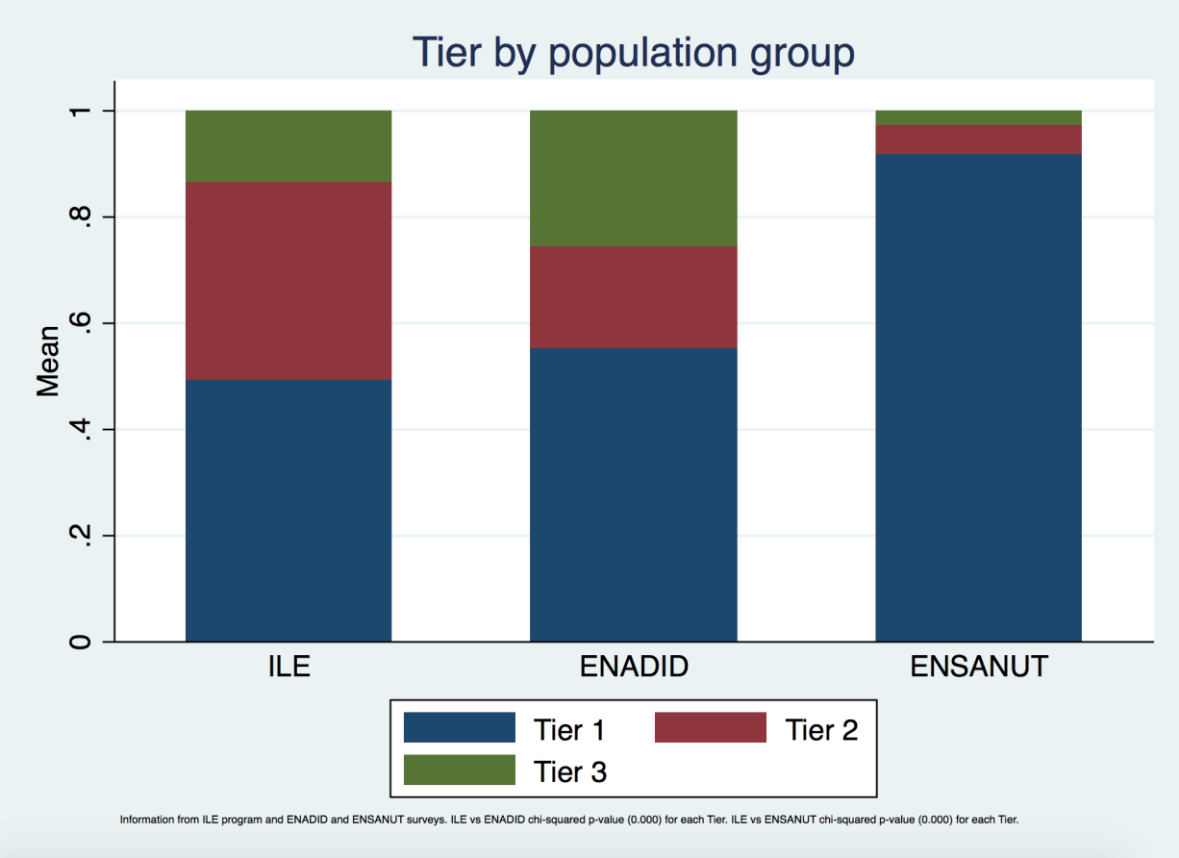

Table 2a. Absolute margins, any contraceptive use, ILE vs ENADID (community-dwelling)

Model	ILE vs ENADID					
	ILE			ENADID		
	Abs margins	CI (95%)		Abs margins	CI (95%)	
Naïve	**0.6324**	0.6281	0.6368	**0.6013**	0.5887	0.6139
Logit after PSM	**0.6365**	0.6320	0.6411	**0.6347**	0.6198	0.6497
Ebalance	**0.6395**	0.6350	0.6441	**0.6417**	0.5928	0.6907
CEM	**0.6368**	0.6325	0.6411	**0.6067**	0.5953	0.6180

Table 2b. Absolute margins, any contraceptive use, ILE vs ENSANUT (post-partum)

Model	ILE vs ENSANUT						ILE vs ENSANUT (without sterilized women)					
	ILE			ENSANUT			ILE			ENSANUT (without sterilized women)		
	Abs margins	CI (95%)		Abs margins	CI (95%)		Abs margins	CI (95%)		Abs margins	CI (95%)	
Naïve	**0.6391**	0.6348	0.6433	**0.6302**	0.6012	0.6591	**0.6389**	0.6347	0.6432	**0.4737**	0.4385	0.5088
Logit after PSM	**0.6388**	0.6345	0.6431	**0.6271**	0.5954	0.6589	**0.6388**	0.6345	0.6431	**0.4787**	0.4412	0.5162
Ebalance	**0.6391**	0.6338	0.6445	**0.5314**	0.4458	0.6170	**0.6294**	0.6017	0.6571	**0.4399**	0.3345	0.5454
CEM	**0.6406**	0.6363	0.6449	**0.5814**	0.5531	0.6096	**0.6418**	0.6375	0.6462	**0.4938**	0.4596	0.5280

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