

1 **Title**

2 Preventing adolescent births: delaying versus spacing in Mexico City's public abortion program

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38 **ABSTRACT**

39 **Objectives** We identified women who used abortion to delay first births versus those who
40 sought to space births in Mexico City's public first trimester abortion program, *Interrupcion Legal*
41 *de Embarazo* (ILE). We hypothesized that younger women, especially students, used abortion
42 to delay first births while older women used abortion to space births.

43 **Study design** We used clinical data from a sample of 47,462 women who had an abortion
44 2007-2016 and classified them as delaying or spacing according to previous births (none versus
45 one or more) prior to the abortion. We used logistic regression to identify sociodemographic,
46 time, and clinical factors associated with delaying versus spacing and calculated absolute
47 multivariable predicted probabilities.

48 **Findings** Overall, 41% of abortions were to delay a first birth; 59% were among women who
49 already had one child or more (spacing). The adjusted probability of using abortion to delay a
50 first birth was 80.5% (CI = 78.4 – 82.6) for women 12-17 years old and 54.3% (CI = 51.5 – 57.2)
51 for women 18-24 years old. Adolescents (12-17 years old) who were employed or students had
52 nearly 90% adjusted probability of using abortion to delay a first birth (employed 87.9; 95% CI =
53 83 – 92.8; students 88.6; 95% CI = 83.1 – 94.1). At all ages, employed women and students
54 had higher probabilities of using abortion to delay a first birth compared with unemployed
55 women and women who work in the home.

56 **Conclusions** Legal first trimester abortion services in Mexico can help delay first births in
57 adolescents, especially students.

58 **Implications** Adolescents and students overwhelmingly use abortion to delay first births in
59 Mexico City's abortion program. Access to abortion should be part of efforts to reduce
60 adolescent births in Mexico.

61 **1. INTRODUCTION**

62 The negative health and social consequences of adolescent birth have been well
63 documented [1, 2]. Women who give birth as adolescents consistently achieve lower levels of
64 education across countries and settings [1, 3, 4]; preventing a first birth can improve educational
65 and economic outcomes for women as well as health outcomes for subsequent children [2, 5].
66 Adolescents have higher levels of unintended pregnancy than older women, making delaying a
67 first birth even more challenging. When primary prevention of unintended pregnancy fails,
68 women use abortion to delay first births or space births. Women need abortion for a variety of
69 complex reasons. Socio-economic reasons, including a desire to pursue education or labor
70 opportunities, consistently rank among the primary reasons women seek abortion globally.

71 Mexico has one of the highest adolescent fertility rates in the Americas; in 2009, it was
72 estimated that 130 per 1,000 females 15-19 experienced a pregnancy. This compares to 57 in
73 the US (highest among developed countries) and 174 in Kenya [6]. The Mexican government
74 has prioritized adolescent pregnancy prevention since 2015, when it implemented a National
75 Strategy for the Prevention of Adolescent Pregnancy (ENAPEA) [7]. Data on the outcomes of
76 adolescent pregnancies are scarce in Mexico, but an estimated 34% of adolescent pregnancies
77 ended in abortion in 2009 [6] and 20% of all births in Mexico in 2012 were to adolescents [8].

78 Mexico City decriminalized first trimester abortion in 2007 and immediately integrated
79 abortion services into the public sector; since then, the public sector abortion program,
80 *Interrupcion Legal de Embarazo* (ILE), has provided over 200,000 legal abortions. Abortion is
81 also available in the private sector in Mexico City. Abortion at any gestational age remains
82 highly restricted in Mexico's other 31 states. Legal exceptions (e.g. rape, risk to health and/or
83 life) exist at the state levels but are not uniformly utilized to the full extent of the law [9].

84 The purpose of this study is to describe whether women seek abortions in the ILE program
85 to delay or to space births. We identify factors associated with using abortion to delay a first

86 birth; we hypothesized that adolescents and women in school would be more likely to seek to
87 delay a first birth than older women and women not in school.

88 **2. METHODS**

89 We used clinical data from a sample of 47,462 women who had an abortion in one of four high-
90 volume sites in the Mexico City ILE program between 2007-2016. Clinical information
91 (gestational age and type of procedure), socio-demographic information (age, education, state
92 of residence, marital status and occupation), obstetric history (number of previous births) and
93 post-abortion contraceptive use are included in the ILE dataset. Description of data extraction
94 and checking is described elsewhere [10, 11]. We excluded women who did not receive an
95 abortion due to presenting past the gestational age limit (4,212/7.65%) [10], suspected ectopic
96 or other reason for referral (621/1.13%) or who were missing outcome data (n=305/0.64%).

97 Our outcome was a binary indicator of whether the abortion was used to delay a first
98 birth or space a birth. We classified women as seeking to delay a birth if she did not report any
99 previous births and as seeking to space if she reported previous births.

100 We included socio-demographic and clinical characteristics available in the medical
101 chart. We classified current occupation as unemployed or working in the home/homemaker
102 (*ama de casa*), employed, or student. We grouped age into 5 categories; categories are
103 unequal to allow us to focus on adolescents and young women compared to older women (12-
104 17, 18-24, 25-29, 30-39, ≥ 40). We classified 12-17 as adolescent because the ILE program
105 requires adult permission for women under 18 [10]. We made an indicator variable for whether
106 the woman resided in Mexico City or traveled from another state where first trimester abortion is
107 not available on request, and we included method of abortion (medication or aspiration). We
108 controlled for year and clustered on clinical site to account for non-independence of
109 observations.

110 We used bivariate statistics to test for differences in delaying versus spacing by all co-
111 variables and logistic regression to identify sociodemographic and clinical factors associated

112 with delaying versus spacing. We calculated multivariate marginal effects and absolute
113 probabilities of our key covariates (age and occupation) to ease interpretation of results [12].

114 We conducted sensitivity analyses excluding variables with the most missing data
115 (occupation); results were robust and we present the full, complete case models here. This
116 study was approved by the Institutional Review Boards of OHUS, INSP, and the Mexico City
117 Ministry of Health (SEDESA). We used Stata version 13 for all analyses [13].

118 **3. RESULTS**

119 Overall, 41% of abortions in our sample were to delay a first birth; 59% were among women
120 who already had one child or more and sought to space births. Women who had an abortion to
121 delay a first birth were more educated (46% in high school and 29% university compared with
122 34% and 9% respectively among those spacing births), and more likely to be in school (39%
123 delaying vs 19% spacing; Table 1). Women delaying first births were also younger; 17% were
124 12-17 years old and 64% 18-24 compared to 2% and 36% of those seeking to space a birth
125 (Table 1 and Figure 1).

126 In our multivariable model (Table 2), women under 25 had higher odds (12-17 years old
127 aOR 14.9 95% CI = 12.0 – 18.4; 18-24 years old aOR 3.6 95% CI = 3.1 – 4.2) of using abortion
128 to delay a first birth compared with women 25-29; women over 30 had lower odds. Students
129 (aOR 6.1 95% CI = 3.6 – 10.2) and employed women (aOR 5.7 95% CI = 3.3 – 9.6) had higher
130 odds of delaying versus spacing compared with unemployed women and women working in the
131 home. Traveling from outside of Mexico City was also associated with using abortion to delay a
132 first birth versus space births (aOR = 1.18; 95% CI = 1.10 – 1.27).

133 The adjusted probability of using abortion to delay a first birth was 80.5% (CI = 78.4 –
134 82.6) for women 12-17 years old and 54.3% (CI = 51.5 – 57.2) for women 18-24 years old
135 (Table 3). Figure 2 presents age and occupation together and shows that adolescents (12-17
136 years old) who were employed or students had nearly 90% (employed 87.9; 95% CI = 83 –
137 92.8; students 88.6; 95% CI = 83.1 – 94.1) adjusted probability of using abortion to delay a first

138 birth. At all ages, employed women and students had higher probabilities of using abortion to
139 delay a first birth compared with unemployed women and women who work in the home (Figure
140 2). See Web Appendix for full table of absolute and relative probabilities.

141 **4. DISCUSSION**

142 We find that women seek first trimester abortion in the Mexico City ILE program to both space
143 births and delay first births. Adolescents 12-17 who are students or employed had a nearly 90%
144 probability of using abortion to delay a first birth, adjusted for other factors. Adolescents 12-17
145 and young women 18-24 had a higher probability of seeking abortion to delay a first birth
146 compared with women 25-29 and women over 30, who were more likely to use abortion to
147 space births, controlling for other factors. Students and employed women had higher
148 probabilities of seeking abortion to delay a first birth (versus space births) across age groups,
149 compared with women who did not work outside the home.

150 Earlier work in Latin America suggested that women primarily used abortion to limit
151 family size, while research in Africa showed that young women with higher levels of education
152 used abortion to delay first births [14, 15]. Our findings show that in the Mexico City public
153 abortion program, younger women in school overwhelmingly use abortion to delay first births.
154 This supports previous research in Canada that found that a larger proportion of younger
155 women used abortion to delay childbearing than older women [16]. However, in Norway,
156 researchers examined the role abortion played in observed changes to later ages at first
157 childbirth and found that abortion did not explain all the delayed childbearing [17], suggesting a
158 concomitant role for contraceptive use as well as abortion to delay first births. In the United
159 Kingdom, an adolescent pregnancy prevention program followed for two decades program shows
160 that an important decline in the adolescents birth rate was first achieved through an increase in
161 abortion rates, and only afterward, through an increase in contraceptive coverage, and therefore
162 a decline in conception rates [18].

163 Education is among the primary reasons women seek to prevent a birth and need
164 abortion [19], along with socioeconomic reasons [20, 21]. Our finding that adolescents who were
165 in school had a 90% probability of needing an abortion to delay a first birth support this.
166 However, education and other socio-economic reasons for abortion have the least popular
167 support in Mexico [22]. Existing exceptions that permit access to abortion, at least in theory, are
168 for rape, to save the life of the woman, to preserve the health of the woman, and due to fetal
169 anomalies. Only two Mexican states have a socio-economic exception. (CITE – GIRE?) Where
170 the health exception exists, it is interpreted narrowly [9]; it does not include mental health, in
171 conflict with the World Health Organization definition of health [23]. More could be done under
172 existing legal frameworks to expand access to abortion for the most common reasons women
173 need the service, such as pursuit of education and employment opportunities.

174 Evidence suggests that receiving a wanted abortion, compared to carrying an unwanted
175 pregnancy to term, improves future aspirations [24] and economic outcomes [25] among women
176 of all ages. Cohort studies focused on adolescents in developed countries have found that
177 adolescents who have abortions have better socio-economic [26, 27] and educational outcomes
178 [26-28] compared to adolescents who give birth. Evidence from Mexico shows that adolescents
179 and young women who have an abortion in their first pregnancy have fewer children at ages
180 20-24 [29].

181 Public policy and intervention strategies to prevent adolescent births in Mexico focus
182 primarily on pregnancy prevention. Primary prevention of pregnancy is important; however, it is
183 a challenge for adolescents to access the most effective forms of contraception outside before
184 and outside of the delivery setting. That is, a common route to access long-acting reversible
185 contraception (IUDs, and implants; LARC), is in the post-partum setting, which is very effective
186 at spacing subsequent births but has obviously failed to prevent the first birth [30]. The public
187 abortion program, ILE, also provides post-abortion contraception at the same rate as immediate
188 post-partum services in Mexico [31]. Other studies suggest that adolescents may face barriers

189 to quality contraceptive care in primary care and pharmacy settings in Mexico [32, 33] and
190 globally [34]. The national adolescent pregnancy prevention strategy, in addition to
191 emphasizing the need to increase access to effective and quality contraception for adolescents,
192 does highlight the goal of eliminating unsafe abortion. It recommends that providers be trained
193 to be able to provide full information for adolescents about abortion law and facilitate access
194 where legal. Whether this happens, however, is unknown.

195 This study has the limitations common to all transversal observational studies; we are
196 only able to identify associations. Our reproductive history information, although taken from the
197 clinical record, is self-report by the woman seeing an abortion. Our sample does not include all
198 abortions in the ILE program; however, our data come from four high-volume facilities, including
199 one specialized in adolescents. We do not have detailed socio-economic data, but given that
200 the public ILE program serves mainly a relatively poor population, occupation may serve as a
201 more useful measure. We excluded women missing employment status information (1.7% of the
202 sample) but outcome status did not differ by missingness. We include only the public sector
203 abortion program; women seeking care in the private sector may have different patterns of
204 delaying and spacing.

205 Legal first trimester abortion in Mexico can help delay first births in adolescents,
206 students, and among women who are able to travel for abortion services. Mexico's experience
207 can be useful for other countries facing high rates of undesired adolescent pregnancy and
208 childbearing. Over ninety (95%) of all births among girls 15-19 occur in low and middle-income
209 countries [35]. Our results suggest that adolescents, and especially students, use abortion
210 overwhelmingly to delay first births. Countries seeking to increase schooling rates and
211 educational achievement among adolescent girls and women and to prevent early motherhood
212 need to take abortion into account and ensure access to safe services.

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321

Table 1. Sample Characteristics

Covariate distributions	Full sample (N=47,462)	Delaying (N=19,592) 41.3%	Spacing (N=27,870) 58.7%	χ^2 p-value +
Age				
12-17	8.27	16.90	2.20	0.000
18-24	47.29	64.00	35.55	0.000
25-29	21.51	13.61	27.06	0.000
30-39	20.09	4.94	30.74	0.000
40-max	2.71	0.41	4.32	0.000
Missing of age	0.13	0.14	0.13	0.883
Education				
Primary	8.70	2.80	12.85	0.000
Secondary	33.04	20.39	41.93	0.000
High school	38.83	46.05	33.76	0.000
University	17.35	28.62	9.42	0.000
Missing of education	2.08	2.14	2.05	0.483
State				
CDMX	71.15	69.70	72.18	0.000
Other state	28.73	30.17	27.72	0.000
Missing of state	0.12	0.14	0.10	0.239
Occupation				
Unemployed/Homemaker	24.49	9.33	35.14	0.000
Employed	46.53	49.97	44.12	0.000
Student	27.24	38.64	19.22	0.000
Missing of occupation	1.74	2.06	1.51	0.000
Type of abortion				
Medication	77.99	78.92	77.34	0.000
Vaccum aspiration	22.01	21.08	22.66	0.000
Missing of type of abortion	0.00	0.00	0.00	---

+Chi-squared for group differences

Table 2: Logistic regression model: sociodemographic and clinical factors associated with delaying versus spacing

VARIABLES	Complete sample (N=46,526)
Age: 12 -17 years old	14.89** [12.025 - 18.428]
Age: 18 - 24 years old	3.61** [3.070 - 4.247]
Age reference category: 25 - 29 years old	---
Age: 30 - 39 years old	0.32** [0.297 - 0.338]
Age: 40 - 54 years old	0.18** [0.160 - 0.213]
Occupation reference category: Unemployed/Homemaker	---
Occupation: Employed	5.65** [3.335 - 9.556]
Occupation: Student	6.05** [3.585 - 10.207]
State reference category: Mexico City	---
State: Any Other State	1.18** [1.095 - 1.273]
Type of abortion reference category: Vacuum aspiration	---
Type of abortion: Medication	1.19** [1.139 - 1.235]

** p<0.01, * p<0.05

For delaying the variable has value of 1 and 0 for spacing

Model also controls for year and clusters on clinical site

Table 3 Adjusted probability of using abortion to delay a first birth by age

Age	Adjusted probability	95% Confidence Interval	
12-17	80.48	78.39	82.57
18-24	54.34	51.52	57.16
25-29	27.07	24.04	30.09
30-39	10.99	9.67	12.31
40-max	6.77	6.01	7.54

325 Note: model adjusts for all covariates in Table 2

326

327