Risk factors for repeat abortions and their spacing: Evidence from registry data in Spain*

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Abstract
Using administrative data on all induced abortions recorded in Spain in 2019, we analyze the characteristics of women undergoing repeat abortions, as well as the spacing with the previous abortion. We find that, compared to women who experience their first abortion, women who undergo a repeat abortion tend to be less educated and are more likely to have dependent children, live alone or be foreign-born, while we estimate a non-monotonic relationship with age. We also report that being low educated, not having an employment, having dependent children, or being foreign-born are all strongly related to a higher number of repeat abortions. Finally, being low educated, foreign-born, or not having an employment is also correlated with a shorter time interval in between the last abortions.

Keywords: birth control, contraception, fertility, unintended pregnancies, women.

JEL codes: J1, J13, I14, I18.

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INTRODUCTION
Abortion is a fundamental issue in women’s wellbeing. Access (or lack thereof) to an abortion not only can affect maternal health (Clarke & Mühlrad, 2021) but can have profound implications on women’s lives by impacting their educational attainment, labor force participation, overall earnings, and balance of power within a couple (Bailey & Lindo, 2017; Cunningham, Myers, Lindo, & Schlosser, 2020; Knowles Myers C., 2017; Oreffice, 2007; Pop-Eleches, 2010).

At the same time, repeat abortions can be seen as a failure of the health service community to help women prevent another unintended pregnancy (Prager, Steinauer, Foster, Darney, & Drey, 2007) with risks for both women’s psychological wellbeing during their lifetime (Törnbom, Ingelhammar, Lilja, Möller, & Svanberg, 1996) and adverse birth outcomes in future pregnancies (Brown, Adera, & Masho, 2008; Klemetti, Gissler, Niinimäki, & Hemminki, 2012; KC, Gissler, & Klemetti, 2020).

The US Supreme Court ruled on June 24, 2022 in Dobbs v. Jackson Women’s Health Organization1 to overturn the constitutional right of American women to get an abortion, impairing women’s ability to access abortion and family planning services, especially among the poor and vulnerable.2 This tide of huge social changes and against women’s health rights affecting millions of women worldwide calls for research on abortion to better understand women most at risk, and to devise health policies to their benefit.

In this study, we investigate the risk and protective factors for repeat abortions and their spacing in Spain for the year 2019 using administrative data from the Ministry of Health, Social Services and Equality. This comprehensive data set contains all recorded induced abortions in 2019 in the whole country, as well as the number of repeat abortions and the date of the previous abortion, in addition to a rich set of women’s demographic and socioeconomic characteristics.

Spain is a large country where women can choose to have an induced abortion for any reason until the 14th week, and for medical reasons between the 14th and the 21st.3 In 2019, the abortion rate in Spain was 11.53 per 1,000 women aged 15-44 (Ministerio de Sanidad, 2021), just a little above 11.21, the average for the period 2010-2018. The total number of abortions was 99149, and 35.87% were repeat abortions.4 This percentage is very similar to that for The Netherlands (33%), lies within the ranges of estimates for other European countries (30-38%), but is much below that estimated for the US (47%).5 Thus, repeat abortions are still a widespread phenomenon.

We find that, compared to women who experience their first abortion, women who undergo a repeat abortion tend to be less educated and are more likely to have dependent

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1 https://www.supremecourt.gov/opinions/21pdf/19-1392_6j37.pdf
2 Knowles Myers (forthcoming) offers a review of changes in the historical policy environment in the United States that serves as the foundation of the empirical literature that estimates the causal effects of access to contraception and abortion.
3 2010 Law of Sexual and Reproductive Health (Ley Orgánica 2/2010, de 3 de marzo, de salud sexual y reproductiva y de la interrupción voluntaria del embarazo): https://www.boe.es/eli/es/lo/2010/03/03/2/con
4 See Tables EV.1, EV.3 and G.7 from the official report on abortions in 2019 (Ministerio de Sanidad, 2021 https://www sanidad.gob.es/ en/profesionales/saludPublica/prevPromocion/embrarazo/docs/IVE_2019.pdf).
5 See Picavet, Goenee, & Wijsen (2013).
children, live alone or be foreign-born, while we estimate a non-monotonic relationship with age. When we focus on the actual number of abortions, we find that being low educated, not having an employment, having dependent children, or being foreign-born are also strongly related to a higher number of repeat abortions. Finally, we find that the socioeconomic factors associated to a shorter time interval (between the woman’s latest 2019 abortion and her previous one) are yet again being low educated, not having an employment, or foreign-born.

There is limited research on the characteristics of women who undergo repeat abortions, and studies vary widely in terms of data availability, from survey data of one hospital in the US (n=398, Prager, Steinauer, Foster, Darney, & Drey (2007)) to registration data of abortion clinics in the Netherlands responsible for about two thirds of abortion procedures in 2010 (n=17,884, Picavet, Goenee, & Wijsen (2013)). However, several consistent findings have been documented. Repeat abortions are more likely among women who have been using some method of birth control (Westfall & Kallail, 1995; Berger, Gold, Andres, Gillett, & Kinch, 1984), among unmarried women (Berger, Gold, Andres, Gillett, & Kinch, 1984; Bracken, Hachamovitch, & Grossman, 1972), among women with more children (Westfall & Kallail, 1995; Steinhoff, Smith, Palmore, Diamond, & Chung, 1979; Heikinheimo, Gissler, & Suhonen, 2008; Makenzius, Tydén, Darj, & Larsson, 2011), and among low-educated women (Heikinheimo, Gissler, & Suhonen, 2008; Makenzius, Tydén, Darj, & Larsson, 2011). The findings regarding age are quite mixed: while some studies found older women have a higher risk (Prager, Steinauer, Foster, Darney, & Drey, 2007; Osler, David, & Morgall, 1997; Westfall & Kallail, 1995; Steinhoff, Smith, Palmore, Diamond, & Chung, 1979), others found younger women have a higher risk (Heikinheimo, Gissler, & Suhonen, 2008; Palanivelu & Oswal, 2007).

Our findings using all abortions in 2019 in a large European country show that women who are low-educated, foreign-born, or do not have an employment remain vulnerable and unable to effectively manage their fertility, even though they were in contact with health services facilities when they had their previous abortion(s). These socioeconomic vulnerable women seem to have difficulties in accessing and/or taking advantage of family planning resources and information, and this is likely to exacerbate socioeconomic inequalities within (e.g. via the negative effect on their own psychological wellbeing) and across (e.g. via the adverse impact on birth outcomes in future pregnancies) generations. We believe there is an urgent need to reshape public policies and reproductive health resources to better integrate abortion provision services with contraception services, in a way that these can be used effectively from the time of a woman’s first abortion, in terms of post-abortion family planning services, contraception, and social support. The goal is to decrease the many unintended pregnancies and repeat abortions (Cohen, 2007) experienced by vulnerable groups of women: the low-educated, those who do not have an employment, and the foreign-born.
MATERIALS AND METHODS
This is a cross-sectional study of women in Spain who seek abortions in 2019. In Spain, any adult woman can choose to have an induced abortion within the first 14 weeks of gestation, according to the Law of Sexual and Reproductive Health passed in 2010. After the 14th week, and within the 21st, it is possible to perform induced abortions for medical reasons.

We have access to all recorded abortions in Spain (N=99149) from the Ministry of Health, Social Services and Equality. The reporting system for abortions in Spain provides reliable and complete data to study the incidence and risk factors of repeat abortions. Each legal induced abortion performed in Spain is logged into the system of the hospital/clinic accredited to perform induced abortions, and periodically submitted (validated and encrypted) to the Ministry of Health, Social Services and Equality in Spain into an electronic data base.

Our aim is to assess what characteristics are associated with a history of at least one previous abortion, with the number of previous abortions, and the spacing of abortions for women undergoing a repeat abortion in 2019. Our main outcomes of interest are: (a) a repeat abortion binary indicator (=0 if no previous abortions, =1 if previous abortions); (b) a count number of previous abortions measure (number of self-reported previous abortions); and (c) the number of months elapsed between the current abortion and the previous one among women who had (at least) a previous abortion (this is computed using the information on the month and the year of the previous and the current abortion).

Our main explanatory variables are: age of the woman in 5-year brackets (from 15-19 to 40-44), education (primary or less, secondary, university), employment status (employed vs. not employed), foreign born (=0 if born in Spain, =1 else), living arrangement indicators (alone, in a couple, with family members, with others), children (=0 if no dependent children, =1 if dependent children), use of contraceptive methods (=0 if the woman does not regularly use contraceptive methods, =1 if the woman regularly uses them), and an indicator of whether the abortion was publicly funded (=0 if no, =1 if yes). Moreover, all regressions include woman’s province of residence (50 provinces). We also use the information on whether there were serious health reasons to undergo the abortion or it was an elective procedure, as well as on the number of weeks of gestation to exclude the rare abortions performed in the third trimester of pregnancy.

Analyses were conducted with Stata statistical software version 17. The code will be publicly available from the Harvard Dataverse repository upon publication.

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6 2010 Law of Sexual and Reproductive Health (Ley Orgánica 2/2010, de 3 de marzo, de salud sexual y reproductiva y de la interrupción voluntaria del embarazo): https://www.boe.es/eli/es/lo/2010/03/03/2/con

7 https://www.sanidad.gob.es/profesionales/saludPublica/prevPromocion/embrazo/home.htm. Instructions on how to access the data are available online: https://www.sanidad.gob.es/en/profesionales/saludPublica/prevPromocion/embrazo/docs/Informe_MetodologicoVE.pdf

The administrative data are anonymized, and institutional review board was not required.

8 Access to the data base with the universe of induced abortions was obtained from the Spanish Ministry of Health in June 2021.

9 The survey questionnaire defines the reason behind the interruption of the pregnancy based on the specific law of sexual and reproductive health and elective interruption of pregnancy in Spain (https://www.boe.es/eli/es/lo/2010/03/03/2/con).
RESULTS

Our final sample size is 97921 abortions, in 50 provinces: we focus on the age group 15-44, 98.98% of all abortions (N=98147), exclude the 149 rare abortions performed in the third trimester of pregnancy (25 weeks of gestation or later), the 14 abortions in the autonomous city of Ceuta, and the 63 abortions in the autonomous city of Melilla (both located on the African continent).

36.04% of the 97921 abortions were repeat abortions, and amongst those women who previously had an abortion, the average (median) number of previous abortions was 1.57 (1): 65.67% had 1 previous abortion, 21.72% had 2 previous abortions, 7.53% had 3 previous abortions, and the remaining 5.08% had 4 or more previous abortions. Moreover, the average time interval between the last abortion in 2019 and the previous one was about 56.5 months (slightly more than 4 years and a half).\(^\text{10}\)

91.08% of the 97921 abortions were elective (i.e., requested by the woman) while the remaining 8.92% were due to medical reasons (including serious risk for the life or health of the pregnant woman, risk of serious anomalies in the fetus, and fetal anomalies incompatible with life or very serious untreatable/incurable illness).

Single vs. repeat abortions

In Table 1 we plot the distribution of characteristics of women who sought abortion (first vs. repeat) in 2019. This provides a univariate analysis of the relationship between the likelihood of repeat abortion vs. first abortion and each demographic characteristic, one at a time. All characteristics, except the reported use of contraceptive methods, appear not to be independent from the type of abortion (first vs. repeat) as judged by the p-value of the Chi-square test.

[Table 1 about here]

In Table 2 we report the average differences between those who had a repeat abortion in 2019 and those who had a first abortion in 2019. The women who had a repeat abortion were 2 years older (mean = 30.19, SD = 6.43) than those who underwent their first abortion (mean = 28.14, SD = 7.38), they were 11 percentage points (pp) less likely to have a university degree (11% vs. 22%), they were 8 pp more likely to be born in a foreign country (43% vs 35%), they were 9 pp more likely to be living in a couple (54% vs. 45%), they were 24 pp more likely to have dependent children (68% vs. 44%), they were 4 pp more likely to have their abortion in the 1st trimester (≤12 weeks of gestation) of pregnancy (93% vs 89%), they were 6 pp more likely to have their abortion publicly funded (79% vs 73%), and they were 3 pp more likely to have an elective abortion (requested the abortion for non-medical reasons, 93% vs 90%). We do not find differences in the likelihood of the mother regularly using contraceptive methods (57% in both cases), and there is a 1 pp difference in the likelihood of being employed (62% amongst those who had a repeat abortion vs. 61% amongst those who had their first abortion).

[Table 2 about here]

\(^{10}\) 56.38, or 56.59 months if we focus on an interval of at least 3 months between the abortion in 2019 and the previous one.
In Table 3 we investigate the predictors of repeat abortions amongst those women who had an abortion in 2019 in a multivariate setting. While here we discuss estimates based on ordinary least squares regressions, the Appendix (Table S1) contains logit estimates and displays the findings in odds ratios format. We run our multivariate regression for three different samples: (1) full sample, (2) adult sample age 18-44 (i.e., full sample excluding minors), and (3) adult sample age 18-44 excluding abortions due to health reasons.

Focusing on the estimates in column (1), we find evidence of a non-monotonic relationship between age and the likelihood of a repeat abortion. The risk of repeat abortion increases with age from 15-19 (point estimate: -0.197, 95% CI: [-0.213, -0.180]) to 30-34 (0.053, [0.039, 0.067]), but then it decreases from 30-34 to 40-44 (reference category: 0). Education is a protective factor in the sense that women who have a university degree are about 20 percentage points less likely to have had an abortion previously than those with primary education or less (-0.212, [-0.224, -0.200]). The gap among women with secondary education and primary education or less is 5 percentage points (-0.053, [-0.063, -0.044]). Being employed seems a protective factor too: employed women who had an abortion in 2019 were about 1.6 pp less likely to have had an abortion before (-0.016, [-0.024, -0.009]).

In terms of risk factors, women who live alone (0.080, [0.062, 0.097]), live in a couple (0.045, [0.028, 0.061]), or live with relatives (0.041, [0.025, 0.058]) are more likely to have a repeat abortion than those who live with others. Having dependent children is associated with an increase in the likelihood of having another abortion of 14 percentage points (0.138, [0.130, 0.146]). Foreign-born women are about 4 pp more likely to have a repeat abortion than those born in Spain (0.047, [0.040, 0.054]). Finally, women who report using contraceptive methods regularly are more likely to have a repeat abortion (0.017, [0.011, 0.024]), and the likelihood of repeat abortion is also higher if the abortion is publicly funded (0.019, [0.011, 0.028]).

The estimates displayed in columns (2) and (3) are qualitatively identical and quantitatively very similar to those in column (1). Perhaps the two main differences are found, first, when looking at the age coefficients and, second, when looking at the coefficient on the woman reporting using contraceptive methods regularly. The finding on the age coefficients is not surprising since the indicator variable 15-19 contains only 18- and 19-year-olds in columns (2) and (3). The discrepancy when looking at the coefficient on the woman reporting using contraceptive methods regularly is likely to be driven by “collider bias”, if both the type of abortion and the use of contraceptive methods are potential determinants of elective abortion behavior.

[Table 3 about here]
Number of previous abortions
We now turn our attention to the determinants of the number of previous abortions among women who had an abortion in 2019. We estimate Poisson regressions to account for the count nature of the data. Table 4 reports estimates of incidence-rate ratios and their 95% confidence intervals.

[Table 4 about here]

We begin with the description of the estimates in column (1). As when studying the determinants of repeat vs. first time abortion, the relationship is non-monotonic between age and number of previous abortions, increasing between the age group 15-19 (0.305, [0.281, 0.330]) to 30-34 (1.158, [1.102, 1.216]), and decreasing between the age group 30-34 to 40-44 (reference: 1), while holding the other variables constant. In terms of socioeconomic status, women with higher education and employed women are expected to have lower rates of repeat abortions: the rate among women with a university degree is less than half of that for women with primary education or less (0.380, [0.362, 0.398]), and the rate among employed women is also lower than that of women who do not have an employment (0.878, [0.856, 0.900]).11 Women who live alone (1.342, [1.248, 1.443]), in a couple (1.201, [1.120, 1.289]), or with relatives (1.171, [1.089, 1.258]) exhibit a higher rate of repeat abortions than those living with others (reference: 1). Similarly, women with dependent children are expected to have a rate 1.6 times greater (1.633, [1.587, 1.681]) for number of repeat abortions than those without dependent children. Foreign-born women have an expected rate of repeat abortions 1.1 times greater (1.146, [1.117, 1.175]) than that of women born in Spain. The expected rate of repeat abortions among women who report using contraceptive methods regularly is lower than that of women who report not using them (0.968, [0.946, 0.991]). Finally, women relying on publicly funded abortions are expected to have a greater rate of number of repeat abortions (1.066, [1.033, 1.100]) than women whose abortions are not publicly funded.

Similar qualitative and quantitative results are found in columns (2) and (3). The Appendix (Table S2) contains Poisson regression estimates after excluding women reporting 6 or more previous abortions (0.43% of observations), with similar qualitative findings for all but one predictor: “women using contraceptive methods regularly”.

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11 Women who are not employed are either “Pensioner”, “Student”, “Unemployed or looking for first employment/job”, “Unpaid household work”, or “Other”.
Spacing between abortions

Finally, in Table 5, we shift our attention to the determinants of the time span in between abortions among women who had a repeat abortion in 2019.\(^{12}\) This is quite a unique feature of our data analysis: we have information on the actual month and year of the current as well as of the previous abortion. We can analyze which characteristics make it more likely for a woman who already had at least one abortion in the past to seek another abortion sooner rather than later. As before, we first focus on column (1).

The spacing between abortions decreases with woman’s age. For instance, the time interval for women aged 15–19 is 6 years less (-72.917 months, [-76.472, -69.361]) than among women aged 40-44 (reference: 0), and among women 35-39 is 1.4 years less (-16.705 months, [-20.282, -13.128]) than among women aged 40-44 (reference: 0). In terms of socioeconomic status, women with a university degree (8.123, [5.546, 10.699]) and those with secondary education (5.853, [4.337, 7.368]) exhibit a longer time interval than women with primary education or less (reference: 0). Employed women also take longer in between abortions (2.809, [1.594, 4.024]) than women who do not have an employment. When looking at living arrangements, it appears that women who live with their relatives have a shorter time interval (-3.976, [-7.374, -0.577]) than those who live with other people. We also find that foreign-born women (-5.142, [-6.413, -3.387]) exhibit a shorter time interval between abortions than native women. No significant differences are documented in time intervals depending on whether women have dependent children (-0.738, [-2.145, 0.670]), whether women use contraceptive methods regularly (-0.764, [-1.984, 0.456]), or whether the abortion was publicly funded (-0.544, [-2.299, 1.121]).

While similar qualitative and quantitative results are found in columns (2) and (3), the living arrangement finding does not seem robust across columns. The Appendix (Table S3) contains regression estimates using the log of months, displaying results that are qualitatively the same.

[Table 5 about here]

\(^{12}\) We focus on intervals of at least 3 months between the last abortion and the previous one.
DISCUSSION

Our findings on the likelihood of a repeat vs. first abortion indicate that it is particularly low education, having dependent children, living alone or being foreign-born that are associated with a higher likelihood of having a repeat abortion rather than a first abortion in 2019 in Spain. These findings echo previous studies by Picavet et al. (2013), who highlight nationality and having had children as important risk factors for repeat abortions in the Netherlands, and by Rodriguez-Alvarez et al. (2016), who emphasize the role of immigrant status in the Basque Country, Spain. While consistent with previous research (Jones, Jerman, & Ingerick, 2018), the high correlation between low education and repeat abortion is striking, but also with being foreign-born. This suggests that the information and counseling services do not reach the population at risk (i.e. women already vulnerable in terms of socioeconomic background), that these women are constrained in how to use health reproductive information and counselling services, or both. This may be possibly due to these vulnerable women’s lack of agency or bargaining power in their reproductive and birth control choices when they live with a partner/spouse.

Similarly, our analysis on the determinants of the actual number of abortions points to low education, not having an employment, having dependent children, or being foreign-born as important risk factors. Fisher et al. (2005), surveying women accessing a regional provider in Ontario in 1998-1999, found that higher-order abortions were associated to being older, using contraception, being foreign-born, and having a history of physical and sexual violence by their male partner. Taken together, all the above analysis reinforces the need to better understand the shortcomings in the provision of contraception information and counseling for these socioeconomically vulnerable groups of women, and why they cannot act upon this information. These are women struggling in the labor market who repeatedly find themselves with unintended pregnancies.

Finally, we estimate that the socioeconomic factors associated to a shorter interval in between the latest two abortions are being low educated (6-8 months shorter interval), not having an employment (3 months shorter interval), or foreign-born (5 months shorter interval). In a rare study of the timing to second abortion, Rose et al. (2015) consider women discharged from a New Zealand public hospital abortion clinic and find that younger age, non-European ethnicity, and number of children have a second abortion sooner. McCall et al. (2016) find a similar pattern about age and children in a region of Scotland, although they do not have any information on the socioeconomic characteristics of these women. Stone & Ingham (2011), in a representative sample of women living in Britain in 2000-2001, measure that half of all second abortions reportedly occurred within 41 months of the previous procedure, and only 10% occurred more than 15 years apart, but these are not linked to any health or socioeconomic characteristics of women.

13 Rodriguez-Alvarez, Borrell, González-Rábago, Martin, & Lanborena (2016) consider only the region of the Basque Country to analyze how immigration status affects repeat abortions between 2009 and 2013, finding that immigrant women from areas other than the Maghreb have higher likelihood of repeat abortions than native women in the Basque Country.

14 Unfortunately, we do not have information on any sociodemographic characteristic (e.g. age, education) of the partner/spouse.
These patterns of more frequent repeat abortions stress the difficulties that vulnerable women have in accessing and/or taking advantage of family planning resources and information, potentially harming their wellbeing and reproductive health. Indeed, it seems that women remain vulnerable and unable to manage their fertility for quite a while, even though they were in contact with health service facilities when they had their previous abortion. This may make these at-risk women even more vulnerable economically, and unable to control their health and decision-making. This is likely to exacerbate socioeconomic inequalities both within (via the negative effect on their own psychological wellbeing) and across (via the adverse impact on birth outcomes in future pregnancies) generations.

All in all, the patterns documented in this study highlight the urgent need to specifically think about reshaping public policies and reproductive health resources in favor of vulnerable groups of women.
CONCLUSION

We have studied the risk and protective factors for repeat abortions and their spacing in Spain the year before the COVID-19 pandemic using administrative data on all recorded abortions. Although in Spain contraceptive services are easily accessible, the 36% prevalence of repeat abortions is relatively high, although lower than in Canada or the US.

We find that, compared to women who experience their first abortion, women who undergo a repeat abortion tend to be less educated and are more likely to have dependent children, live alone or be foreign-born, while we estimate a non-monotonic relationship with age. We also report that being low educated, not having an employment, having dependent children, or being foreign-born are all strongly related to a higher number of repeat abortions. Finally, being low-educated, foreign-born, or not having an employment is also correlated with a shorter time-interval in between the last two abortions.

To the best of our knowledge, this is the first study on repeat abortions using administrative data covering all induced abortions in a large country in a recent year, with a comprehensive set of demographic and socioeconomic characteristics, including information on foreign-born status as well as the month and year of the current abortion and previous abortion (if any).

Our study has two main limitations. One is about the interpretation of our estimated associations, and the other is about the measurement of previous abortions. First, the study uses cross-sectional observational data, and our findings on risk and protective factors need to be interpreted as correlations, not as reflecting causal effects. Second, information on previous abortions is self-reported. Women may find it difficult to admit having had prior abortions (Somers, 1977), and this reporting issue may vary with women's characteristics.

With these limitations in mind, we nevertheless hope that our findings contribute to a better understanding of repeat abortions to help women gain control of their reproductive lives. Our study suggests an ineffective outreach of family planning services to vulnerable women (Miller & Valente, 2016). Healthcare services and policymakers should target family planning and contraception services more effectively at the time of a woman's first abortion, especially tailored for high-risk groups: low-educated, those without an employment, or foreign-born. A reduction in unintended pregnancies, and as a byproduct repeat abortions and their frequency, would prevent a subsequent increase in inequalities both within (via the negative impact of repeat abortion on women's lifetime wellbeing) and across (via the adverse impact on birth outcomes in future pregnancies) generations.
Table 1: Distribution of women characteristics by first vs. repeat abortion

| Characteristic                           | First abortion (n) | Repeat abortion (n) | p-value |
|-----------------------------------------|-------------------|--------------------|---------|
| Age (y) (N=97921)                       |                   |                    |         |
| 15-19                                   | 8650              | 1369               | 0.000   |
| 20-24                                   | 14441             | 6470               |         |
| 25-29                                   | 13148             | 8685               |         |
| 30-34                                   | 11544             | 8975               |         |
| 35-39                                   | 10174             | 7103               |         |
| 40-44                                   | 4671              | 2871               |         |
| Education (N=96490)                     |                   |                    | 0.000   |
| Primary or less                         | 8619              | 6597               |         |
| Secondary                               | 39635             | 24273              |         |
| University                              | 13389             | 3977               |         |
| Employed (N=95827)                      |                   |                    | 0.002   |
| No                                      | 23896             | 13159              |         |
| Yes                                     | 37330             | 21442              |         |
| Foreign born (N=96751)                  |                   |                    | 0.000   |
| No                                      | 40189             | 19865              |         |
| Yes                                     | 21540             | 15157              |         |
| Living arrangement (N=96075)            |                   |                    | 0.000   |
| Alone                                   | 12620             | 7543               |         |
| Living in couple                        | 27739             | 18680              |         |
| Living with parents / family            | 18622             | 7409               |         |
| Living with others                      | 2473              | 989                |         |
| Dependent children (N=96007)            |                   |                    | 0.000   |
| No                                      | 34189             | 11162              |         |
| Yes                                     | 27047             | 23609              |         |
| Trimester of pregnancy (N=97921)        |                   |                    | 0.000   |
| First                                   | 56045             | 32675              |         |
| Second                                  | 6583              | 2618               |         |
| Contraceptive methods (N=85,679)        |                   |                    | 0.605   |
| No                                      | 23434             | 13550              |         |
| Yes                                     | 30938             | 17757              |         |
| Publicly funded abortion (N=97,921)     |                   |                    | 0.000   |
| No                                      | 16598             | 7549               |         |
| Yes                                     | 46030             | 27744              |         |
| Elective (N=97,921)                     |                   |                    | 0.000   |
| No                                      | 6414              | 2318               |         |
| Yes                                     | 56214             | 32975              |         |

Note: p-value from a Chi-square test of independence between rows and columns for each variable. First trimester of pregnancy (≤ 12 weeks of gestation). Second trimester of pregnancy (13-24 weeks of gestation).
Table 2: Comparison of average characteristics between first abortion and repeat abortion

| Characteristic                  | First Abortion | Repeat Abortion | Diff | p-value |
|--------------------------------|----------------|-----------------|------|---------|
|                                | Mean           | N               | Mean | N       |      |
| Age                            | 28.14          | 62628           | 30.19| 35293   | 2.05 | 0.000|
| University                     | 0.22           | 61643           | 0.11 | 34847   | -0.11| 0.000|
| Employed                       | 0.61           | 61226           | 0.62 | 34601   | 0.01 | 0.002|
| Foreign born                   | 0.35           | 61729           | 0.43 | 35022   | 0.08 | 0.000|
| Living alone                   | 0.21           | 61454           | 0.22 | 34621   | 0.01 | 0.000|
| Living in couple               | 0.45           | 61454           | 0.54 | 34621   | 0.09 | 0.000|
| Living with parents / family   | 0.30           | 61454           | 0.21 | 34621   | -0.09| 0.000|
| Living with others             | 0.04           | 61454           | 0.03 | 34621   | -0.01| 0.000|
| Dependent children             | 0.44           | 61236           | 0.68 | 34771   | 0.24 | 0.000|
| Trimester 1 (≤ 12 weeks)       | 0.89           | 62628           | 0.93 | 35293   | 0.04 | 0.000|
| Use contraception methods      | 0.57           | 54372           | 0.57 | 31307   | 0.00 | 0.605|
| Publicly funded                | 0.73           | 62628           | 0.79 | 35293   | 0.06 | 0.000|
| Elective                       | 0.90           | 62628           | 0.93 | 35293   | 0.03 | 0.000|

Note: p-value from the difference in means is obtained as the p-value that the slope coefficient from a linear regression of the variable (characteristic) on a constant and a repeat abortion indicator (=0 if first abortion, =1 if repeat abortion) is zero, using robust standard errors.
| Age       | (1)     | (2)     | (3)     |
|-----------|---------|---------|---------|
| 15-19     | -0.197*** | -0.166*** | -0.175*** |
|           | (-0.213, -0.180) | (-0.184, -0.149) | (-0.194, -0.156) |
| 20-24     | -0.029*** | -0.031*** | -0.042*** |
|           | (-0.044, -0.014) | (-0.046, -0.016) | (-0.058, -0.026) |
| 25-29     | 0.041*** | 0.040*** | 0.031*** |
|           | (0.027, 0.055) | (0.026, 0.054) | (0.016, 0.046) |
| 30-34     | 0.053*** | 0.052*** | 0.047*** |
|           | (0.039, 0.067) | (0.038, 0.066) | (0.032, 0.062) |
| 35-39     | 0.026*** | 0.025*** | 0.022*** |
|           | (0.011, 0.040) | (0.011, 0.040) | (0.007, 0.038) |

| Education | (1)     | (2)     | (3)     |
|-----------|---------|---------|---------|
| University | -0.212*** | -0.218*** | -0.214*** |
|           | (-0.224, -0.200) | (-0.230, -0.206) | (-0.227, -0.201) |
| Secondary | -0.053*** | -0.060*** | -0.059*** |
|           | (-0.063, -0.044) | (-0.070, -0.049) | (-0.070, -0.048) |
| Employed  | -0.016*** | -0.019*** | -0.016*** |
|           | (-0.024, -0.009) | (-0.026, -0.012) | (-0.024, -0.009) |

| Living arrangements | (1)     | (2)     | (3)     |
|---------------------|---------|---------|---------|
| Living alone        | 0.080*** | 0.081*** | 0.081*** |
|                     | (0.062, 0.097) | (0.063, 0.099) | (0.063, 0.100) |
| Living in a couple  | 0.045*** | 0.046*** | 0.055*** |
|                     | (0.028, 0.061) | (0.029, 0.062) | (0.038, 0.072) |
| Living with relatives | 0.041*** | 0.045*** | 0.046*** |
|                     | (0.025, 0.058) | (0.028, 0.062) | (0.029, 0.064) |

| Dependent children  | 0.138*** | 0.137*** | 0.136*** |
|                     | (0.130, 0.146) | (0.129, 0.145) | (0.127, 0.145) |

| Foreign born        | 0.047*** | 0.046*** | 0.042*** |
|                     | (0.040, 0.054) | (0.039, 0.054) | (0.034, 0.050) |

| Use contraceptive methods | 0.017*** | 0.018*** | 0.008** |
|                           | (0.011, 0.024) | (0.011, 0.025) | (0.001, 0.015) |

| Publicly funded abortion | 0.019*** | 0.019*** | 0.025*** |
|                         | (0.011, 0.028) | (0.010, 0.027) | (0.015, 0.034) |

| Observations | 81168 | 78129 | 72052 |
|-------------|------|------|------|
| R-squared   | 0.095 | 0.084 | 0.085 |

| Adults only? | No | Yes | Yes |
|-------------|----|----|----|
| Elective only? | No | No | Yes |

Note: Reference category: women aged 40-44, with primary education or less, not employed, living with others, with no children in charge, born in Spain, not using contraceptive methods, whose abortion has not been publicly funded, and whose province of residence is Álava. 95% confidence intervals based on robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
|                          | (1)           | (3)           | (5)           |
|--------------------------|---------------|---------------|---------------|
| **Age**                  |               |               |               |
| 15-19                    | 0.305***      | 0.386***      | 0.371***      |
|                          | (0.281, 0.330)| (0.356, 0.419)| (0.341, 0.404)|
| 20-24                    | 0.796***      | 0.792***      | 0.764***      |
|                          | (0.754, 0.840)| (0.750, 0.835)| (0.722, 0.809)|
| 25-29                    | 1.088***      | 1.085***      | 1.047*        |
|                          | (1.035, 1.144)| (1.032, 1.140)| (0.994, 1.103)|
| 30-34                    | 1.158***      | 1.156***      | 1.128***      |
|                          | (1.102, 1.216)| (1.101, 1.215)| (1.072, 1.188)|
| 35-39                    | 1.067**       | 1.066**       | 1.043         |
|                          | (1.014, 1.122)| (1.014, 1.122)| (0.989, 1.099)|
| **Education**            |               |               |               |
| University               | 0.380***      | 0.377***      | 0.386***      |
|                          | (0.362, 0.398)| (0.360, 0.395)| (0.368, 0.405)|
| Secondary                | 0.743***      | 0.738***      | 0.740***      |
|                          | (0.720, 0.766)| (0.716, 0.762)| (0.717, 0.764)|
| Employed                 | 0.878***      | 0.873***      | 0.882***      |
|                          | (0.856, 0.900)| (0.852, 0.895)| (0.860, 0.904)|
| **Living arrangements**  |               |               |               |
| Living alone             | 1.342***      | 1.344***      | 1.346***      |
|                          | (1.248, 1.443)| (1.250, 1.445)| (1.249, 1.452)|
| Living in a couple       | 1.201***      | 1.202***      | 1.236***      |
|                          | (1.120, 1.289)| (1.121, 1.290)| (1.149, 1.330)|
| Living with relatives    | 1.171***      | 1.180***      | 1.184***      |
|                          | (1.089, 1.258)| (1.097, 1.268)| (1.099, 1.276)|
| Dependent children       | 1.633***      | 1.626***      | 1.604***      |
|                          | (1.587, 1.681)| (1.580, 1.673)| (1.557, 1.653)|
| Foreign born             | 1.146***      | 1.143***      | 1.119***      |
|                          | (1.117, 1.175)| (1.114, 1.172)| (1.090, 1.148)|
| Use contraceptive methods| 0.968***      | 0.969***      | 0.939***      |
|                          | (0.946, 0.991)| (0.946, 0.992)| (0.916, 0.962)|
| Publicly funded abortion | 1.066***      | 1.064***      | 1.080***      |
|                          | (1.033, 1.100)| (1.031, 1.098)| (1.044 - 1.118)|
| **Observations**         | 81168         | 78129         | 72052         |
| Adults only?             | No            | Yes           | Yes           |
| Elective only?           | No            | No            | Yes           |

Note: Reference category: women aged 40-44, with primary education or less, not employed, living with others, with no children in charge, born in Spain, not using contraceptive methods, whose abortion has not been publicly funded, and whose province of residence is Álava.

95% confidence intervals based on robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
Table 5: Determinants of abortion spacing among women who had an abortion in 2019
Dependent variable = months between current abortion and previous abortion
Linear regression model: OLS regression estimates (95% Confidence intervals)

|                | (1)                          | (2)                          | (3)                          |
|----------------|------------------------------|------------------------------|------------------------------|
| **Age**        |                              |                              |                              |
| 15-19          | -72.917*** (-76.472 - 69.361) | -72.647*** (-76.35 - 68.960) | -71.848*** (-75.560 - 68.136) |
| 20-24          | -62.507*** (-65.835 - 59.179) | -62.160*** (-65.614 - 58.707) | -62.204*** (-65.658 - 58.749) |
| 25-29          | -46.505*** (-49.815 - 43.195) | -46.261*** (-49.701 - 42.820) | -46.284*** (-49.725 - 42.843) |
| 30-34          | -31.267*** (-34.647 - 27.887) | -31.087*** (-34.602 - 27.573) | -31.098*** (-34.613 - 27.584) |
| 35-39          | -16.705*** (-20.282 - 13.128) | -16.177*** (-19.899 - 12.455) | -16.181*** (-19.903 - 12.459) |
| **Education**  |                              |                              |                              |
| University     | 8.123*** (5.547 - 10.699)    | 8.471*** (5.802 - 11.140)    | 8.512*** (5.833 - 11.191)    |
| Secondary      | 5.853*** (4.337 - 7.368)     | 5.876*** (4.323 - 7.429)     | 5.940*** (4.366 - 7.514)     |
| **Employed**   | 2.809*** (1.594 - 4.024)     | 2.754*** (1.508 - 4.000)     | 2.716*** (1.465 - 3.966)     |
| **Living arrangements** |                          |                              |                              |
| Living alone   | -2.657 (-6.200 - 0.886)      | -2.240 (-5.910 - 1.430)      | -2.278 (-5.963 - 1.406)      |
| Living in a couple | -2.902* (-6.299 - 0.494)     | -2.478 (-6.000 - 1.045)      | -2.516 (-6.054 - 1.023)      |
| Living with relatives | -3.976*** (-7.374 - 0.577)  | -3.338* (-6.867 - 0.191)     | -3.331* (-6.881 - 0.219)     |
| **Dependent children** | -0.738 (-2.145 - 0.670)      | -0.555 (-1.991 - 0.882)      | -0.585 (-2.027 - 0.857)      |
| **Foreign born** | -5.142*** (-6.413 - 3.872)   | -4.971*** (-6.271 - 3.670)   | -5.016*** (-6.323 - 3.709)   |
| **Use contraceptive methods** | -0.764 (-1.984 - 0.456)     | -0.246 (-1.499 - 1.007)      | -0.277 (-1.540 - 0.986)      |
| **Publicly funded** | -0.544 (-2.299 - 1.212)      | 0.009 (1.900 - 1.198)        | 0.034 (-1.884 - 1.952)       |

Observations: 29079, R-squared: 0.150
Adults only?: No, Yes
Elective only?: No, Yes

Note: Reference category: women aged 40-44, with primary education or less, not employed, living with others, with no children in charge, born in Spain, not using contraceptive methods, whose abortion has not been publicly funded, and whose province of residence is Álava.
95% confidence intervals based on robust standard errors in parentheses.
+*** p<0.01, ** p<0.05, * p<0.1
## Table S1: Protective and risk factors of repeat abortion among women who had an abortion in 2019

Dependent variable = 1 if repeat abortion, = 0 no previous abortion

Logit probability model: Odds ratios estimates (95% Confidence intervals)

|                | (1)          | (2)          | (3)          |
|----------------|--------------|--------------|--------------|
| **Age**        |              |              |              |
| 15-19          | 0.318***     | 0.403***     | 0.386***     |
|                | (0.290, 0.348)| (0.366, 0.444)| (0.350, 0.427)|
| 20-24          | 0.869***     | 0.860***     | 0.819***     |
|                | (0.813, 0.930)| (0.804, 0.919)| (0.764, 0.879)|
| 25-29          | 1.189***     | 1.182***     | 1.134***     |
|                | (1.117, 1.266)| (1.110, 1.259)| (1.061, 1.211)|
| 30-34          | 1.250***     | 1.247***     | 1.217***     |
|                | (1.175, 1.330)| (1.172, 1.326)| (1.140, 1.299)|
| 35-39          | 1.115***     | 1.114***     | 1.096***     |
|                | (1.047, 1.188)| (1.046, 1.187)| (1.025, 1.172)|
| **Education**  |              |              |              |
| University     | 0.361***     | 0.355***     | 0.364***     |
|                | (0.340, 0.383)| (0.335, 0.377)| (0.342, 0.387)|
| Secondary      | 0.787***     | 0.775***     | 0.776***     |
|                | (0.753, 0.822)| (0.741, 0.810)| (0.741, 0.813)|
| Employed       | 0.937***     | 0.925***     | 0.938***     |
|                | (0.907, 0.968)| (0.895, 0.956)| (0.906, 0.970)|
| **Living arrangements** |          |              |              |
| Living alone   | 1.479***     | 1.484***     | 1.489***     |
|                | (1.353, 1.616)| (1.357, 1.622)| (1.357, 1.633)|
| Living in a couple | 1.268***     | 1.270***     | 1.330***     |
|                | (1.165, 1.381)| (1.166, 1.384)| (1.217, 1.453)|
| Living with relatives | 1.238***     | 1.256***     | 1.268***     |
|                | (1.134, 1.351)| (1.150, 1.371)| (1.158, 1.389)|
| **Dependent children** |          |              |              |
| 1.858***     | 1.845***     | 1.824***     |
|                | (1.791, 1.927)| (1.779, 1.914)| (1.756, 1.895)|
| **Foreign born** | 1.240***     | 1.233***     | 1.209***     |
|                | (1.200, 1.282)| (1.193, 1.275)| (1.168, 1.251)|
| **Use contraceptive methods** |          |              |              |
| 1.082***     | 1.085***     | 1.035**      |
|                | (1.048, 1.116)| (1.051, 1.120)| (1.001, 1.070)|
| **Publicly funded** | 1.098***     | 1.093***     | 1.126***     |
|                | (1.054, 1.144)| (1.049, 1.139)| (1.076, 1.177)|

**Observations** | 81,168 | 78,129 | 72,052
**Adults only?** | No | Yes | Yes
**Elective only?** | No | No | Yes

Note: Reference category: women aged 40-44, with primary education or less, not employed, living with others, with no children in charge, born in Spain, not using contraceptive methods, whose abortion has not been publicly funded, and whose province of residence is Álava.

95% confidence intervals in parentheses.

*** p<0.01, ** p<0.05, * p<0.1
Table S2: Protective and risk factors of number of previous abortions among women who had an abortion in 2019  
*Dependent variable = previous number of abortions*  
Poisson regression: IRR estimates (95% Confidence intervals)

|                      | (1)                      | (2)                      | (3)                      |
|----------------------|--------------------------|--------------------------|--------------------------|
| **Age**              |                          |                          |                          |
| 15-19                | 0.329***                 | 0.415***                 | 0.400***                 |
|                      | (0.305 - 0.354)          | (0.384 - 0.449)          | (0.369 - 0.433)          |
| 20-24                | 0.841***                 | 0.836***                 | 0.809***                 |
|                      | (0.801 - 0.883)          | (0.796 - 0.877)          | (0.769 - 0.851)          |
| 25-29                | 1.118***                 | 1.115***                 | 1.080***                 |
|                      | (1.069 - 1.169)          | (1.066 - 1.165)          | (1.031 - 1.130)          |
| 30-34                | 1.170***                 | 1.168***                 | 1.145***                 |
|                      | (1.120 - 1.221)          | (1.118 - 1.220)          | (1.095 - 1.198)          |
| 35-39                | 1.078***                 | 1.077***                 | 1.061**                  |
|                      | (1.031 - 1.127)          | (1.030 - 1.126)          | (1.013 - 1.111)          |
| **Education**        |                          |                          |                          |
| University           | 0.409***                 | 0.407***                 | 0.417***                 |
|                      | (0.391 - 0.428)          | (0.389 - 0.425)          | (0.398 - 0.436)          |
| Secondary            | 0.779***                 | 0.774***                 | 0.776***                 |
|                      | (0.757 - 0.801)          | (0.752 - 0.797)          | (0.753 - 0.799)          |
| Employed             | 0.906***                 | 0.900***                 | 0.909***                 |
|                      | (0.885 - 0.927)          | (0.880 - 0.921)          | (0.888 - 0.931)          |
| **Living arrangements** |                        |                          |                          |
| Living alone         | 1.318***                 | 1.320***                 | 1.327***                 |
|                      | (1.230 - 1.413)          | (1.232 - 1.415)          | (1.235 - 1.425)          |
| Living in a couple   | 1.184***                 | 1.185***                 | 1.223***                 |
|                      | (1.107 - 1.267)          | (1.108 - 1.268)          | (1.140 - 1.311)          |
| Living with relatives | 1.167***                 | 1.176***                 | 1.187***                 |
|                      | (1.089 - 1.251)          | (1.098 - 1.261)          | (1.105 - 1.275)          |
| Dependent children   | 1.613***                 | 1.605***                 | 1.585***                 |
|                      | (1.568 - 1.659)          | (1.561 - 1.651)          | (1.540 - 1.632)          |
| Foreign born         | 1.132***                 | 1.129***                 | 1.110***                 |
|                      | (1.106 - 1.159)          | (1.102 - 1.155)          | (1.083 - 1.137)          |
| Use contraceptive methods | 0.990                   | 0.991                   | 0.961***                 |
|                      | (0.969 - 1.012)          | (0.969 - 1.013)          | (0.939 - 0.983)          |
| Publicly funded      | 1.061***                 | 1.058***                 | 1.074***                 |
|                      | (1.029 - 1.093)          | (1.027 - 1.091)          | (1.040 - 1.110)          |

| Observations        | 80,800                   | 77,761                   | 71,709                   |
| Adults only?        | No                       | Yes                      | Yes                      |
| Elective only?      | No                       | No                       | Yes                      |

Note: Reference category: women aged 40-44, with primary education or less, not employed, living with others, with no children in charge, born in Spain, not using contraceptive methods, whose abortion has not been publicly funded, and whose province of residence is Álava.  
95% confidence intervals based on robust standard errors in parentheses.  
*** p<0.01, ** p<0.05, * p<0.1
Table S3: Determinants of abortion spacing among women who had an abortion in 2019

Dependent variable = log(months between current abortion and previous abortion)

Linear regression model: OLS regression estimates (95% Confidence intervals)

| Age        | (1)          | (2)          | (3)          |
|------------|--------------|--------------|--------------|
| 15-19      | -1.426***    | -1.439***    | -1.403***    |
|            | (-1.496, -1.357) | (-1.511, -1.366) | (-1.479, -1.327) |
| 20-24      | -1.027***    | -1.031***    | -1.033***    |
|            | (-1.079, -0.975) | (-1.085, -0.977) | (-1.087, -0.979) |
| 25-29      | -0.650***    | -0.656***    | -0.657***    |
|            | (-0.699, -0.600) | (-0.707, -0.604) | (-0.708, -0.605) |
| 30-34      | -0.398***    | -0.403***    | -0.403***    |
|            | (-0.448, -0.349) | (-0.454, -0.351) | (-0.455, -0.352) |
| 35-39      | -0.222***    | -0.219***    | -0.220***    |
|            | (-0.273, -0.171) | (-0.273, -0.166) | (-0.273, -0.166) |

| Education  |              |              |              |
|------------|--------------|--------------|--------------|
| University | 0.119***     | 0.124***     | 0.124***     |
|            | (0.070, 0.168) | (0.073, 0.174) | (0.074, 0.175) |
| Secondary  | 0.102***     | 0.103***     | 0.104***     |
|            | (0.071, 0.134) | (0.070, 0.135) | (0.071, 0.137) |
| Employed   | 0.060***     | 0.059***     | 0.058***     |
|            | (0.035, 0.085) | (0.034, 0.085) | (0.032, 0.083) |

| Living arrangements |              |              |              |
|---------------------|--------------|--------------|--------------|
| Living alone        | -0.057       | -0.049       | -0.049       |
|                     | (-0.126, 0.013) | (-0.121, 0.024) | (-0.122, 0.023) |
| Living in a couple  | -0.047       | -0.038       | -0.039       |
|                     | (-0.114, 0.020) | (-0.108, 0.032) | (-0.109, 0.031) |
| Living with relatives | -0.057*     | -0.047       | -0.046       |
|                     | (-0.126, 0.011) | (-0.119, 0.024) | (-0.118, 0.026) |
| Dependent children  | -0.015       | -0.017       | -0.018       |
|                     | (-0.043, 0.014) | (-0.046, 0.013) | (-0.048, 0.011) |
| Foreign born        | -0.065***    | -0.064***    | -0.066***    |
|                     | (-0.090, -0.039) | (-0.090, -0.038) | (-0.092, -0.040) |
| Use contraceptive methods | -0.004     | 0.005        | 0.003        |
|                     | (-0.028, 0.020) | (-0.020, 0.030) | (-0.022, 0.028) |
| Publicly funded     | 0.011        | 0.030        | 0.031*       |
|                     | (-0.022, 0.045) | (-0.006, 0.067) | (-0.006, 0.068) |

| Observations | 29079 | 27289 | 27083 |
| R-squared    | 0.127 | 0.127 | 0.122 |
| Adults only? | No    | Yes   | Yes   |
| Elective only? | No    | No    | Yes   |

Note: Reference category: women aged 40-44, with primary education or less, not employed, living with others, with no children in charge, born in Spain, not using contraceptive methods, whose abortion has not been publicly funded, and whose province of residence is Álava.

95% confidence intervals based on robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1
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