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IMPACTS OF PROFAMILIA PROGRAM SPREAD ON CONTRACEPTIVE USE AND FERTILITY RATES IN COLOMBIA DURING ITS INTRODUCTION

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FERTILITY RATES IN COLOMBIA DURING ITS INTRODUCTION

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By

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Abstract

I examine the effect of the Profamilia program during its beginning years over the 1960s and 1970s as it spread across Colombia. I find that Profamilia effectively delays first birth, intercourse, and age at marriage, and reduces the probability of having had a teen birth. These outcomes were also linked to increased literacy rates, improved educational attainment, and an increase in employment. Birth spacing and contraceptive use increased. These findings support current research that improving access to family planning services is an effective method for decreasing women's fertility and improving educational and employment opportunities for women. The implication that having access to family planning services at younger ages has a more significant impact on each of these outcomes argues for a community-wide commitment to improved sexual and reproductive health access for all ages, even below fertility ages.

Keywords: contraceptive use, family planning, fertility, first birth, women's health, children's health, Colombia, development, Profamilia

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I. <u>Introduction</u>

Reducing unwanted fertility through contraceptive access provides a multitude of benefits to women. Family planning has a strong link to human rights, gender equality, and women's empowerment (Starbird 2016). Additionally, it allows adolescents to consider the effects of young pregnancies and allows girls to marry at older ages and begin childbearing later in life. In 2012, about 85 million pregnancies were unintended. This is about 40% of all global pregnancies and it was projected to rise to 92 million by 2015 (Tsui 2010). In 2014, 225 million women living in developing countries wanted to stop or delay childbearing using contraceptives (Singh 2014). Additionally, of the 125 million women who give birth each year, 54 million attended less than the recommended four antenatal visits recommended by the World Health Organization. Forty-three million didn't give birth in a health facility and 33 million have newborns who need but don't receive care for health complications. Sixty-five million women each year have a miscarriage, stillbirth, or abortion and many of these women do not receive medical care. If all unmet need for contraceptives was met, unintended pregnancies would drop by 70% from 74 million to 22 million. Maternal deaths would drop by 67% and newborn deaths would drop by 77% (Singh 2014). It's estimated that meeting modern contraceptive services would cost $9.4 billion. Increasing spending on contraceptive services would reduce pregnancy-related care by $1.47 for each additional dollar spent on family planning and contraceptive services (Singh 2014).

Profamilia is a family-planning program in Colombia that works to provide sexual education and family planning resources to communities. Profamilia began in Bogota in 1965 and spread across the country. Following its introduction in 1965, it was the country's main family planning provider for three decades. This paper examines the impact of Profamilia's

spread on women's fertility and related outcomes. Specifically, I estimate whether access to family planning services at younger ages increased Profamilia's impact on women.

To examine the impact, I took advantage of the geographic spread of the Profamilia program. The Profamilia program was able to achieve country-wide coverage, but the rollout was staggered across three decades (Miller 2011). Profamilia's introduction to Colombia makes it ideal to look at the impact of the program as it was introduced because it did not target communities with high demand as they spread. Because the spread of the program was not targeted to higher demand communities, the date Profamila began in a location is effectively randomly assigned (Miler 2010). This allowed me to better break down the effect of family planning at different ages of fertility. Additionally, by using county fixed effects and county by birth year trends, I can isolate the impact of the Profamilia program independent of birth year trends and county characteristics. I compare age cohorts under 15, 15-19, and 20-24 to women who received access to Profamilia at 25 years old or older.

Profamilia effectively delays first birth, intercourse, and age at marriage, and reduces the probability of having had a teen birth. Each of these effects is stronger when women are exposed to Profamilia when they are younger. These fertility and intercourse outcomes were also linked to increased literacy rates, improved educational attainment, and an increase in employment. Birth spacing and contraceptive use increased. All these effects were stronger for women who were exposed to family planning services at younger ages. These findings support current research that improving access to family planning services is an effective method for decreasing women's fertility and improving educational and employment opportunities for women.

In Section 2, I will introduce previous research on the Profamilia program and its effect on both contraceptive use and attitudes toward contraceptive use. I will also introduce the

history of the Profamilia program. Finally, we'll look at why decreasing fertility rates and interdelivery intervals improve maternal health. Section 3 introduces the Demographic Health Surveys used in the estimation. I analyze the impact of Profamilia on first birth, intercourse, age at marriage, teen birth, literacy rates, educational attainment, employment, birth spacing, and contraceptive use. Section 4 discusses the regression approach. Section 5 explores the results. Section 6 concludes and looks at the implications of access to family planning and the argument for early and widespread access to family planning services.

II. Literature Review

Colombia and the Profamila program have previously interested researchers. Miller (2010) found that women who were introduced to Profamilia as teenagers obtained 0.05 more years of schooling, were 7% more likely to work in the formal sector, and 2% less likely to cohabit with male partners. Additionally, delayed first births rather than reduced lifetime fertility rates appear to be a better predictor of socioeconomic gains (Miller 2010).

During the 1960s and 1970s, Profamilia began in Bogota and then spread across the county. The increased access to family planning services likely decreased the nation's fertility rate. Figure 1 shows that the reduction in Colombia's fertility rate over the 1960s and 1970s exceeds any other South American country, despite the fact that Colombia is geographically and socioeconomically similar to other nearby Latin American countries (Guzman et. al 1996).
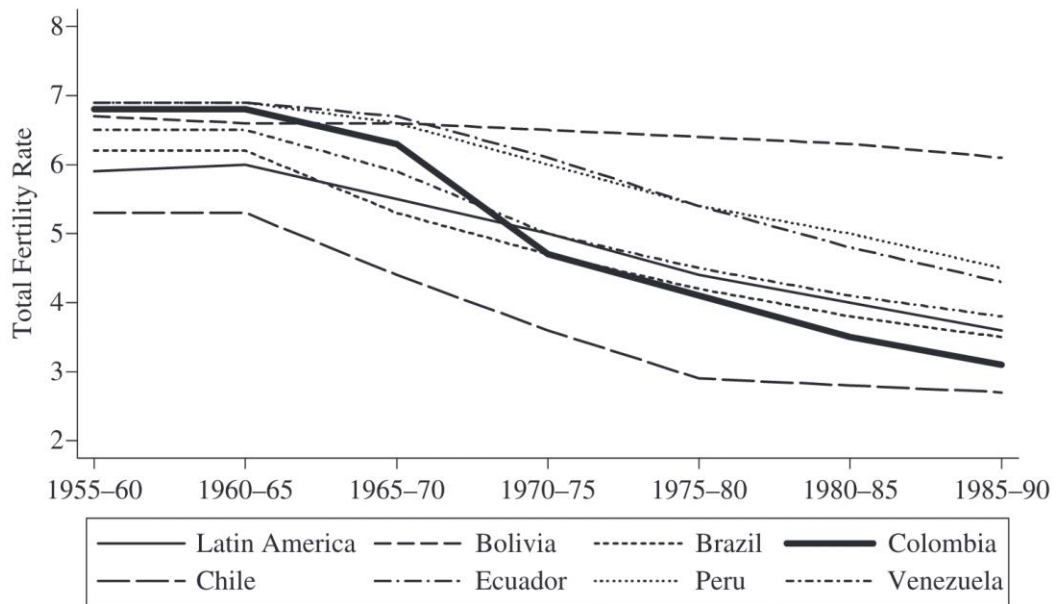
Fig. 1. *Total Fertility Rates in Latin America by Country and Quinquennia, 1955–60 to 1985–90.* *Source:* Guzman *et al.* (1996).

An analysis of attitudes of Colombian women through a collaboration with the Program of Comparative Fertility Studies in Colombia found that knowledge of contraceptive techniques as well as access to contraceptives increased contraceptive use (Baldwin 1976). Additionally, they found that women of higher socioeconomic status with higher education levels and those who lived in urban areas increased their use of family planning services. Previous studies had argued that fertility could not be significantly lowered without modernization occurring first. Traditional women are as likely as modern women to use contraceptives that don't require supplies but are less likely to use those that require technical knowledge. Therefore Baldwin 1976 finds that increasing contraceptive knowledge rather than modernism is the factor in increasing contraceptive use. Additionally, cost and accessibility also were found to be critical factors in contraceptive use. Because Baldwin suggests that inadequate knowledge of birth control methods or restricted access to contraceptive supplies were probably responsible for the limited practice of birth control in Colombia than were motivational factors associated with

modernism, this provides a strong argument for Profamilia's role rather than development in general decreasing fertility (Baldwin 1976).

Studies in Matlab, Bangladesh, and Navrongo, Ghana showed that increasing access to family planning services reduces fertility and improves birth spacing. In Matlab, Canning (2012) found that women's earnings, assets, and BMI, as well as children's schooling and children's BMI, improved in areas with improved access to family planning services compared with outcomes in control areas. These reductions in fertility also enhance economic growth because of reduced youth dependency and increased women's participation in paid labor.

Bauserman (2022) used data from women enrolled in NICHD Global Network Maternal Newborn Health Registry and found that short intervals between pregnancies lead to poor maternal and neonatal outcomes. As previously discussed, contraceptive use has been shown to improve birth spacing in studies performed in Bangladesh and Ghana. This increased birth spacing is associated with improved mother and child health outcomes. A short interdelivery interval is defined as between 6 and 17 months. Women in low and lower-middle-income countries with differing interdelivery intervals (short (6-17 months), reference (18-36 months), 37-60 months, and long (61-180 months)) were evaluated for adverse maternal and neonatal incomes. Women with a short interdelivery interval had increased risks of neonatal death, stillborn, and low birth weight. Additionally, a short interdelivery interval was associated with an increased risk of hemorrhage, hypertensive disorders, fetal malposition, infection, obstructed labor, hospitalization, preterm delivery, and neonatal hospitalization (Bauserman 2020).

III. Data Sources and Methodology

Data

To assess the impact of early versus late exposure to Profamilia, I use individual-level data on women from the 1986 and 1990 Colombia Demographic and Health Surveys (DHS). The DHS collects data on fertility, family planning, reproductive health, child health, nutrition, and other demographic and health factors. This cross-sectional data is collected every five years and surveys women aged 13 to 49. It includes a nationally representative probabilistic sample and includes women in both rural and urban areas. Figure 2 shows the regions that the DHS samples were pulled from.

The women in the DHS are matched to their respective counties based on matching county and municipality codes to DANES codes (*Statiods*). Additionally, these counties were matched to the year that Profamilia started in each county using start dates collected from Miller (2010). The first county in my study was Medellin in 1967, followed by Armero, Bucaramanga, Buenaventura, Cucaita, Manizales, Neiva, San Juan de Pasto, Puerto Berrio, and Sogamoso in 1968. The program continued to expand and the last counties where Profamilia was implemented were Bello, Florencia, Ocaña, Riohacha, and San Andrés in 1987. These dates, county names, and DANES codes are available in Appendix I.

I restrict the sample to women in counties with known Profamilia start dates in Miller (2010) and over the age of 25 at the time of the survey to be able to study employment and completed education effects and observe variation in whether the program was implemented earlier or later in their life.

Figure 2. Map of Colombia's regions from 1986 DHS Survey
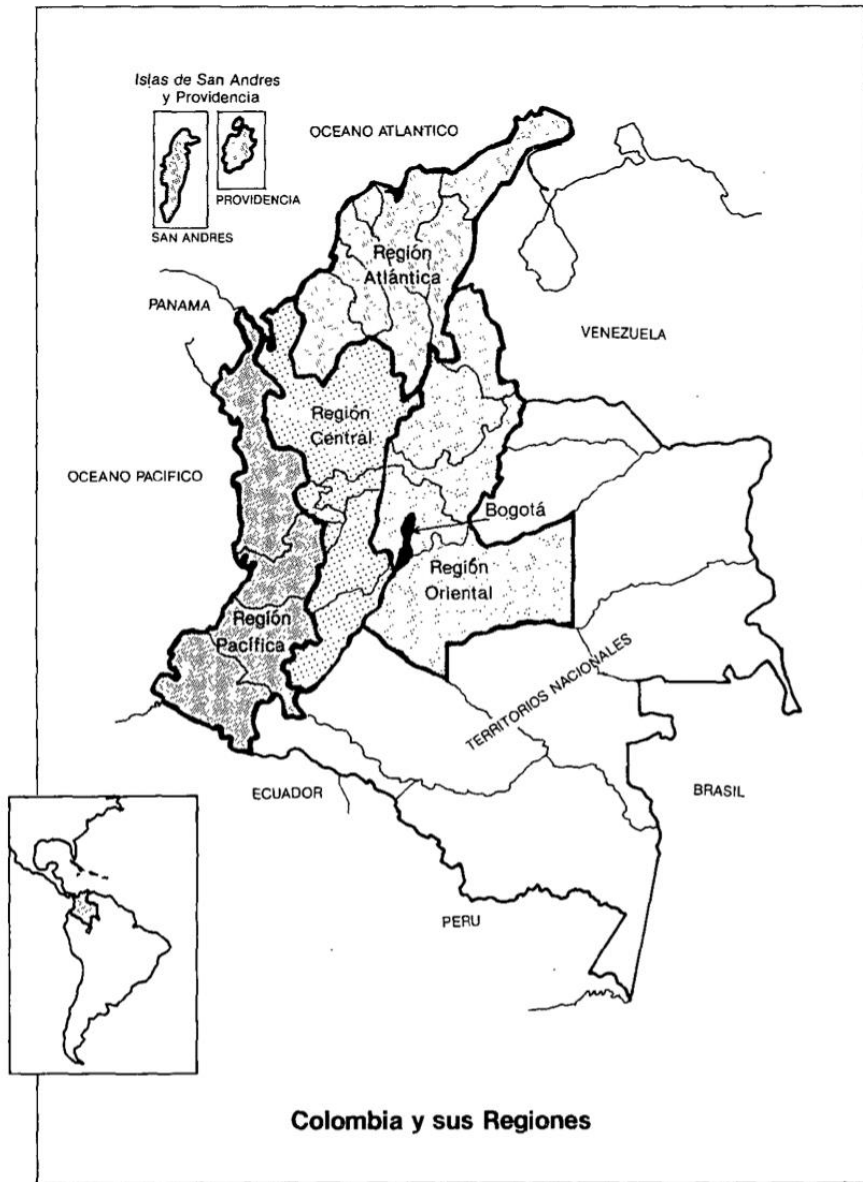
Figure 2 shows the regions of Colombia in the 1986 and 1990 Demographic Health Surveys. Women were surveyed from the Atlantic, Pacific, Oriental, and Central Regions (Ministerio de Salud de Colombia 1986).

Ninety-five percent of respondents were from urban regions while 4.3% were from rural residences. In the 1970s, the urban population of Colombia was about 60% (World Bank), reflective of survey oversampling of urban areas rather than population demographics.

Table 1. Tabulation of Age Cohorts

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.
age0014	3813	.518	.5
age1519	3813	.178	.383
age2024	3813	.14	.347
age2529	3813	.11	.313
age3034	3813	.035	.184
age3539	3813	.01	.101
age4044	3813	.005	.07

Table 1 shows the age cohorts for the age a woman was when Profamilia came to her county.

My key variable is the year Profamilia came to a women's county. Most women in the 1986 and 1990 surveys had Profamilia begin in their county before the age 15 (51.8). 17.8% of women had Profamilia come to their county when they were between 15-19 years old. 14% of women had Profamilia come to their county when they were between 20-24 years old. In the regressions that follow, I use ages 25 and above, corresponding to 16 percent of the sample, as the omitted reference category to estimate the impact of receiving Profamilia relatively early in life.

I examine the impact of Profamilia on fertility rates, sexual behavior, contraceptive use and on improving women's independence and autonomy. Table 2 reports summary statistics of key variables.

Table 2. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Age at First Birth	3190	28.107	5.255	14	48
Age at Marriage	3245	20.214	4.539	9	48
Has Had Teen Birth	3813	.027	.161	0	1
Has Not Had Intercourse	3813	.097	.295	0	1
Age at First Intercourse	3428	19.422	4.402	11	97
Number of Previous Children	3813	2.7	2.254	0	16
Modern Method Used?	3813	.764	.425	0	1
Did Not Want Last Child	1321	.416	.493	0	1
Years Between First and Second Child	2593	3.796	2.825	0	24
Literacy	3813	.957	.202	0	1
Secondary Education or Higher	3813	.543	.498	0	1
Currently Employed	3813	.442	.497	0	1

Table 3 shows means and standard deviations of the nine outcomes evaluated for the effectiveness of the Profamilia program in Colombian counties.

One of the key criteria evaluated was whether access to family planning services delayed age at first birth and age at first marriage. The mean age at first birth was 28.1 years old and the

mean age at first marriage was 20.2 years old. To assess whether Profamilia decreased these types of pregnancies, I looked at whether a woman had had her first child before 20 years of age and defined this as teen pregnancy. About 2.7% of women had a teenage birth. Nine-point seven percent of women had not had intercourse when they were surveyed. Of the women surveyed who had had intercourse, their average age of first intercourse was 19.4 years old.

Looking at the direct impacts of contraceptive use, women were asked whether they had ever used contraceptive methods. They responded that they never had, used only folkloric methods, had used only traditional methods, or had used modern methods with 76.4% of women using traditional or modern methods. One way to look at improved ability to control fertility was decreased unwanted fertility. 41.6% of women did not want their last child. These criteria included both women who wanted the child but wanted to have it later and women who did not want the child at all. Finally, two riskier types of pregnancy and birth are teen pregnancy and short interdelivery intervals. To evaluate the impact of Profamilia on interdelivery intervals, I subtracted the year of second birth from the year of first birth to calculate the birth interval between a woman's first and second births. I used this metric to see if Profamilia increased spacing between births. The average number of years between a woman's first and second child was 3.796.

Along with fertility metrics, I wanted to see if Profamilia improved literacy, educational attainment, and employment. Previous literature suggests that delaying motherhood increases hours worked and wages. Miller (2010) found that delaying motherhood leads to a substantial increase in career earnings of 10% per year of delay, a small increase in the wage rate of 3%, and an increase in career hours worked by 5%. In terms of educational outcomes, Profamilia was evaluated on whether it increased women's literacy rates and whether a woman surveyed

received secondary education or higher. About 96.5% of women surveyed could read. 61.6% of women surveyed had received secondary education or higher and 44.2% of women were currently employed.

Empirical Methods

I estimate the impact of Profamilia on a woman's outcomes depending on her age when the program was brought to her community. As Profamilia now covers all of Colombia, the effects are based on comparing how women who were exposed to Profamilia early in life compare to those who were exposed later. Based on the program start dates in each county, I used women from age 15-45 and broke them into five-year age groups (program start pre 15, 15-19, 20-24) based on when Profamilia began in her county.

I estimate regressions of the following form for woman *i* in county *c* interviewed in survey year *t*:

$$y_{ict} = \beta_0 + \beta_1(under15_{ic}) + \beta_2(age15 - 19_{ic}) + \beta_3(age20 - 24_{ic}) + \alpha_t + \alpha_c + (\delta_c \times birthyear_i) + e_{ict}$$

where *y* represents one of the outcomes noted above and β_1 through β_3 are the coefficients of interest representing how the outcome changes when exposed to Profamilia early in life compared with later. I include fixed effects for the survey year, α_t, and county, α_c, to control for differences between the survey years and between counties. County specific linear birth trends, $\delta_c x birthyear_i$, serve to control for age trends between women of different ages within the same county.

In this regression, I include age cohorts: under 15, 15-19, and 20-24 and compare them to women who gained access to Profamilia after 25 years old. My primary focus is looking at the effect of having Profamilia in the county earlier or later in life. I use this same model for each of

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my outcomes.

IV. Results

Tables 3-6 report estimates on the impact of earlier access to Profamilia family planning services. Profamilia effectively delayed first birth, intercourse, age at marriage, the probability of having had a teen birth, and the probability of having had intercourse. These outcomes were also linked to increased literacy rates, improved educational attainment, and an increase in employment. Birth spacing and contraceptive use increased.

Table 3.

VARIABLES	(1) Age at First Birth	(2) Age Marriage	(3) Has Had Intercourse	(4) Age at First Intercourse	(5) Total Children Ever Born
age0014	2.153***	1.119	-0.219***	0.704	-0.085
	(0.624)	(0.707)	(0.043)	(0.815)	(0.382)
age1519	2.234***	0.983***	-0.155***	0.871*	-0.198
	(0.472)	(0.350)	(0.031)	(0.466)	(0.300)
age2024	1.121**	0.728**	-0.072***	0.573*	-0.348
	(0.544)	(0.333)	(0.020)	(0.301)	(0.218)
County FE	yes	yes	yes	yes	yes
County x Birth Year Trends	yes	yes	yes	yes	yes
Observations	3,190	3,245	3,813	3,428	3,813
R-squared	0.348	0.054	0.070	0.049	0.301

Robust standard errors in parentheses

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

Robust standard errors in parentheses clustered at the county level. Coefficients represent changes relative to Profamilia starting in a respondent's district when they were over the age of 30. All regressions include an indicator for survey year, county fixed effects, and county-birth year linear trends.

Profamilia was effective in delaying the age at first birth. I can see the clearest impact for cohorts that were exposed to Profamilia before age 15. Being under 15 years of age when

Profamilia started is associated with age at first birth being delayed by 2.153 years ($p<0.01$). For women who were between the ages of 15 and 19, exposure to Profamilia is associated with a delay of 2.234 years of first birth ($p<0.01$). Finally, for women who were between the ages of 20 and 24, exposure to Profamilia is associated with a delay of 1.121 years of first birth ($p<0.05$).

Profamilia and access to family planning programs did not only impact the age at first birth but also pushed back the age at first marriage. This could be reflective of changing attitudes towards women as they gained more control over their fertility. Being under 15 years of age when Profamilia started is not statistically significant for delaying marriage. Profamilia exposure is effective at older ages, but the impact decreased the older a woman was when Profamilia came to her county. For women who were between the ages of 15 and 19, exposure to Profamilia is associated with a delay of 0.983 years for marriage ($p<0.01$). For women who were between the ages of 20 and 24, exposure to Profamilia is associated with a delay of 0.728 years ($p<0.05$). Delays in age at first birth are larger than delays in marriage suggesting that Profamilia had a stronger impact on delaying pregnancy. Access to contraception delayed the connection between marriage and childbearing.

There is additional evidence that access to Profamilia decreased the probability of having had intercourse. Being under 15 years of age when Profamilia started is associated with a 21.9 percentage point decrease in the likelihood of having had intercourse ($p<0.01$). For women who were between the ages of 15 and 19, exposure to Profamilia is associated with a 15.5 percentage point decrease in the likelihood of having had intercourse ($p<0.01$). For women who were between the ages of 20 and 24, exposure to Profamilia is associated with a 7.2 percentage point decrease in likelihood of having had intercourse ($p<0.01$).

Profamilia also increased the age at first intercourse. Being under 15 years of age when Profamilia started did not affect age at first intercourse. Profamilia was effective at older ages, but the impact decreased the older a woman was when Profamilia came to her county. For women who were between the ages of 15 and 19, exposure to Profamilia is associated with a delay of 0.871 years for first intercourse ($p<0.1$). For women who were between the ages of 20 and 24, exposure to Profamilia is associated with a delay of 0.573 years for first intercourse ($p<0.1$). This increase in age at first intercourse is an important factor in considering future contraceptive use. Compared with women who are 18 years or older at the time of their first intercourse, women who are younger than 15, are twice as likely to report a gap in contraceptive use (Magnusson 2012). Delaying first intercourse often indicates lower rates of risky sexual behavior and less unplanned pregnancies.

Column 5 shows that early access to Profamilia did not significantly decrease the total number of children born for any of the age cohorts (under 15, 15-19, 20-24). As many women in the DHS have yet to complete their fertility, this may still be consistent with Miller (2010) who found that older women in the Colombian census had 5% fewer children over their entire lifetime.

Table 4.

VARIABLES	(1) Modern Contraceptive Use	(2) Not Want Child	(3) Teen Birth	(4) First to Second Child Interval
age0014	0.500***	-0.228	-0.040**	1.121***
	(0.137)	(0.155)	(0.017)	(0.379)
age1519	0.507***	-0.145	-0.037***	1.307***
	(0.105)	(0.100)	(0.012)	(0.264)
age2024	0.311***	-0.136	-0.017*	0.576**
	(0.072)	(0.087)	(0.010)	(0.212)
County FE	yes	yes	yes	yes
County x Birth Year Trends	yes	yes	yes	yes
Observations	3,428	1,321	3,813	2,593
R-squared	0.189	0.038	0.019	0.056

Robust standard errors in parentheses

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

Robust standard errors in parentheses clustered at the county level. Coefficients represent changes relative to Profamilia starting in a respondent's district when they were over the age of 30. All regressions include an indicator for survey year, county fixed effects, and county-birth year linear trends.

As expected, the presence of family planning services increased the probability that women would have used contraceptive methods. Profamilia increases both access to contraceptives and sexual education. Giving women both access to resources and education to protect their sexual health and have autonomy over their fertility dramatically increased the

probability of using contraceptive methods. Column 1 of Table 4 shows that being under 15 years of age when Profamilia started is associated with a 50-percentage point increase in the likelihood of having used contraceptive methods (p<0.01). For women who were between the ages of 15 and 19, exposure to Profamilia is associated with a 50.7 percentage point increase in the likelihood of having used contraceptive methods (p<0.01). Finally, for women who were between the ages of 20 and 24, exposure to Profamilia is associated with a 0.311 percentage point increase in the likelihood of having used contraceptive methods (p<0.01).

One of the metrics discussed is whether a mother wanted her last child. In my study, this was defined as both wanting the child, but later and not wanting the child at all. If unwanted pregnancies were eliminated, fertility would decrease from 3.5 births per woman to a replacement level of just over two (Bongaarts 1994). Therefore, showing that access to family planning programs at younger ages decreased unwanted pregnancies and specifically unwanted births would show that I could decrease unwanted fertility. This could also address population growth issues alongside the improvement of women's quality of life. Estimates in column 2 show that Profamilia did not decrease the probability that a respondent did not want their last child.

Along with looking at increasing the age at first birth, I was interested in whether Profamilia specifically decreased the likelihood of having had a teen birth. Estimates in column 3 show that being under 15 years of age when Profamilia started is associated with a 4 percentage point decrease in the likelihood of having had a teen birth (p<0.05). For women who were between the ages of 15 and 19, exposure to Profamilia is associated with a 3.7 percentage point decrease in the likelihood of having had a teen birth (p<0.01). For women who were between the

ages of 20 and 24, exposure to Profamilia is associated with a 1.7 percentage point decrease in the likelihood of having had a teen birth ($p<0.1$).

Increasing intervals between births improves outcomes for both mothers and children. Women with short birth intervals increase risks of neonatal death, stillborn and low birth weight. Short birth intervals also increase the risk of hemorrhage, hypertensive disorders, fetal malposition, infection, obstructed labor, hospitalization, preterm delivery, and neonatal hospitalization (Bauserman 2020). Profamilia successfully increased the interval between a woman's first and second birth. Estimates in column 4 show being under 15 years of age when Profamilia started is associated with an increased birth interval between first and second birth of 1.121 years ($p<0.01$). This impact was similar for women who were between the ages of 15 and 19, exposure to Profamilia is associated with an increased birth interval between first and second birth of 1.307 years ($p<0.01$). For women who were between the ages of 20 and 24, exposure to Profamilia is associated with an increased birth interval between first and second birth of 0.576 years ($p<0.05$). Increased access to contraceptives allows women to better plan and control their fertility. This is seen as a decrease in having babies with short interdelivery intervals.

Table 5.

VARIABLES	(1) Literacy	(2) Secondary Education or Higher	(3) Currently Employed
age0014	0.078**	0.099*	0.108
	(0.028)	(0.056)	(0.064)
age1519	0.067***	0.049	0.114**
	(0.024)	(0.043)	(0.046)
age2024	0.063***	0.056**	0.035
	(0.019)	(0.026)	(0.037)
County FE	yes	yes	yes
County x Birth Year Trends	yes	yes	yes
Observations	3,813	3,813	3,813
R-squared	0.047	0.147	0.063

Robust standard errors in parentheses

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

Robust standard errors in parentheses clustered at the county level. Coefficients represent changes relative to Profamilia starting in a respondent's district when they were over the age of 30. All regressions include an indicator for survey year, county fixed effects, and county-birth year linear trends.

Profamilia was also effective in increasing literacy rates and educational attainment. This is likely due to women being in school longer due to delayed first births and marriages. Again, I see the greatest effect for women who were exposed to Profamilia in their younger age ranges. Estimates in column 1 show that being under 15 years of age when Profamilia started is associated with a 7.8 percentage point increase in literacy rates compared to women who were

exposed to Profamilia when they were 30 years old or older (p<0.01). Profamilia continued to be effective at older ages, but the impact decreased the older a woman was when Profamilia came to her county. For women who were between the ages of 15 and 19, exposure to Profamilia is associated with a 6.7 percentage point increase in literacy rates (p<0.05). Finally, for women who were between the ages of 20 and 24, exposure to Profamilia is associated with a similar 6.3 percentage point increase in literacy rates (p<0.05).

When I evaluate the impact of increased educational attainment, younger cohorts saw larger increases in the level of educational attainment. Estimates in column 2, being under 15 years of age when Profamilia started, are associated with a 9.9 percentage point increase in the likelihood of achieving a secondary or higher level of education (p<0.1). For women who were between the ages of 15 and 19, exposure to Profamilia did not affect the likelihood of achieving a secondary or higher level of education (p<0.01). Finally, for women who were between the ages of 20 and 24, exposure to Profamilia is associated with a 5.6 percentage point increase in the likelihood of achieving a secondary or higher level of education (p<0.05).

Profamilia improved the likelihood that women would be employed. Possible mechanisms for this increase in employment could be increased educational attainment and literacy. Additionally, being older at the age of marriage and age at first birth allows women to establish their careers before beginning caring for their families. Estimates in column 3 show that being under 15 years of age when Profamilia started was not associated with being employed. For women who were between the ages of 15 and 19, exposure to Profamilia is associated with an 11.4 percentage point increase in the likelihood of being employed when interviewed (p<0.01). For women who were between the ages of 20 and 24, exposure to Profamilia was not associated with being employed.

V. Conclusion

Evaluating multiple measures of how family planning programs change fertility rates and impact other aspects of women's health creates robust reasoning on why to invest in family planning services. To combat unwanted fertility in the developing world, family planning services are effective in decreasing the number of unwanted pregnancies, whether they were children who were wanted later or not at all. By decreasing unwanted pregnancies, families can invest more in the children they do plan. This leads to higher rates of education and better employment opportunities for children who receive more investment during their childhood.

This paper fills in gaps from previous studies focused on the effectiveness of Profamilia, by specifically looking at changes in the age of first intercourse and the method used along with other fertility methods. This new work can support that women delay their marriage, intercourse, and first birth when supported by sufficient family planning resources. This shift also allows women to improve their literacy, have higher educational attainment, and increase the probability of being employed. All these metrics support further economic development as women can be more involved outside the home and have more time to develop their human capital separate from their husbands.

Profamila had huge implications for women's empowerment and development since its introduction in Bogota in 1965. For many outcomes, the effects of planning services are strongest the earlier that women are exposed to the program in their county. The early exposure of Profamilia provides strong support that family planning programs should be spread as quickly as possible to maximize the number of women exposed at younger ages.

Giving women access to contraceptives and family planning services gives them more autonomy over their fertility choices. This paper shows that this independence is related to delayed marriage, intercourse, and first birth. The impact of these choices increases both women's empowerment and educational opportunities. Further investment in family planning will not only be cost-effective but accelerate economic growth by increasing women's human capital and decreasing the burden of unwanted fertility.

Works Cited

Amin, Ruhul, et al. "Poor Women's Participation in Credit-Based Self-Employment: The Impact on

Their Empowerment, Fertility, Contraceptive Use, and Fertility Desire in Rural Bangladesh."

The Pakistan Development Review, vol. 34, no. 2, 1995, pp. 93–119.

Association Between Information Source and Use of Modern Contraceptive Methods: Analysis by

Gender in Colombia 2015-2016.

Bailey, Martha J., et al. "The Opt-In Revolution? Contraception and the Gender Gap in Wages."

American Economic Journal: Applied Economics, vol. 4, no. 3, July 2012, pp. 225–54. *DOI.org*

(Crossref), https://doi.org/10.1257/app.4.3.225.

Bailey, Martha, and Jason Lindo. *Access and Use of Contraception and Its Effects on Women's*

*Outcomes in the U.S.*w23465, National Bureau of Economic Research, June 2017, p. w23465.

DOI.org (Crossref), https://doi.org/10.3386/w23465.

Baldwin, W. H., and T. R. Pitt Ford. "Modernism and Contraceptive Use in Colombia." *Studies in*

Family Planning, vol. 7, no. 3, Mar. 1976, pp. 75–79.

Bauserman, Melissa, et al. "The Relationship between Birth Intervals and Adverse Maternal and

Neonatal Outcomes in Six Low and Lower-Middle Income Countries." *Reproductive Health*,

vol. 17, no. 2, Nov. 2020, p. 157. *BioMed Central*, https://doi.org/10.1186/s12978-020-01008-

4.

Between Tradition and Modernity: The Transition of Contraception Use in Colombia.

http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0120-35842009000200005.

Accessed 11 Sept. 2021.

Bongaarts, John. "The Impact of Population Policies: Comment." *Population and Development*

Review, vol. 20, no. 3, 1994, pp. 616–20. *JSTOR*, https://doi.org/10.2307/2137604.

Canning, David, and T. Paul Schultz. "The Economic Consequences of Reproductive Health and

    Family Planning." *The Lancet*, vol. 380, no. 9837, July 2012, pp. 165–71. *ScienceDirect*,

    https://doi.org/10.1016/S0140-6736(12)60827-7.

Darroch, Jacqueline E., and Susheela Singh. "Trends in Contraceptive Need and Use in Developing

    Countries in 2003, 2008, and 2012: An Analysis of National Surveys." *The Lancet*, vol. 381,

    no. 9879, May 2013, pp. 1756–62. *ScienceDirect*, https://doi.org/10.1016/S0140-

    6736(13)60597-8.

Ehrlich, Paul R., and John P. Holdren. "Impact of Population Growth." *Science*, Mar. 1971. world,

    www.science.org, https://doi.org/10.1126/science.171.3977.1212.

Kearney, Melissa S., and Phillip B. Levine. *Subsidized Contraception, Fertility, and Sexual*

    Behavior. Working Paper, 13045, National Bureau of Economic Research, Apr. 2007. *National*

    Bureau of Economic Research, https://doi.org/10.3386/w13045.

Kishor, Sunita. *Domestic Violence Measurement in the Demographic and Health Surveys: The*

    History and the Challenges. p. 10.

Law, Gwillim. *Colombia Municipalities*. http://www.statoids.com/yco.html. Accessed 19 Mar. 2022.

Magnusson, Brianna M., et al. "Early Age at First Intercourse and Subsequent Gaps in Contraceptive

    Use." *Journal of Women's Health*, vol. 21, no. 1, Jan. 2012, pp. 73–79. *PubMed Central*,

    https://doi.org/10.1089/jwh.2011.2893.

Miller, Amalia R. "The Effects of Motherhood Timing on Career Path." *Journal of Population*

    Economics, vol. 24, no. 3, July 2011, pp. 1071–100. *DOI.org (Crossref)*,

    https://doi.org/10.1007/s00148-009-0296-x.

Miller, Grant. "Contraception as Development? New Evidence from Family Planning in Colombia."

    The Economic Journal, vol. 120, no. 545, June 2010, pp. 709–36. *Silverchair*,

    https://doi.org/10.1111/j.1468-0297.2009.02306.x.

Quisumbing, A.R., and J. A. Maluccio. "Resources at Marriage and Intrahousehold Allocation:

    Evidence from Bangladesh, Ethiopia, Indonesia, and South Africa." *Oxford Bulletin of*

Economics and Statistics, vol. 65, no. 3, 2003, pp. 283–327. Scopus, *Scopus*,

https://doi.org/10.1111/1468-0084.t01-1-00052.

Quisumbing, Agnes R., and John A. Maluccio. "Resources at Marriage and Intrahousehold

Allocation: Evidence from Bangladesh, Ethiopia, Indonesia, and South Africa*." *Oxford

Bulletin of Economics and Statistics*, vol. 65, no. 3, 2003, pp. 283–327. *Wiley Online Library*,

https://doi.org/10.1111/1468-0084.t01-1-00052.

Ramirez Ocampo, J. "[Profamilia: immense unknown contribution]." *Profamilia: Planificacion,

Poblacion Y Desarollo*, vol. 6, no. 16, Dec. 1990, pp. 4–7.

Schoumaker, Bruno. *Reconstructing Long Term Fertility Trends with Pooled Birth Histories*. p. 24.

Schultz, T. Paul. *Women's Role in the Agricultural Household: Bargaining and Human Capital*.

Working Paper, 803, Center Discussion Paper, 1999. *www.econstor.eu*,

https://www.econstor.eu/handle/10419/98390.

Singh, Susheela, et al. *Adding It Up: The Costs and Benefits of Investing in Sexual and Reproductive

Health 2014*. Dec. 2014. *www.guttmacher.org*, https://www.guttmacher.org/report/adding-it-

costs-and-benefits-investing-sexual-and-reproductive-health-2014.

Starbird, Ellen, et al. "Investing in Family Planning: Key to Achieving the Sustainable Development

Goals." *Global Health: Science and Practice*, vol. 4, no. 2, June 2016, pp. 191–210. *PubMed

Central*, https://doi.org/10.9745/GHSP-D-15-00374.

Tsui, Amy O., et al. "Family Planning and the Burden of Unintended Pregnancies." *Epidemiologic

Reviews*, vol. 32, 2010, pp. 152–74. *PubMed*, https://doi.org/10.1093/epirev/mxq012.

Appendix I.

County Name	County Code	Profamilia Start Year
Armenia	63001	1969
Armero	73055	1968
Barrancabermeja	68081	1971
Barranquilla	8001	1968
Bello	5088	1987
Bucaramanga	68001	1968
Buenaventura	76109	1968
Cali Santiago de	76001	1969
Cartagena de Indias	13001	1970
Cartagena del Chairá	18150	1970
Caucasia	5154	1976
Cucaita	15224	1968
Florencia	19290	1987
Florencia	18001	1987
Manizales	17001	1968
Medellín	5001	1967
Montería	23001	1969
Neiva	41001	1968
Ocaña	54498	1987
Palmira	76520	1970
Pasto [, San Juan de]	52001	1968

Pereira	66001	1969
Popayán	19001	1971
Puerto Berrío	5579	1968
Quibdó	27001	1985
Riohacha	44001	1987
Rionegro	5615	1981
San Andrés	88001	1987
San Andrés	68669	1987
Santa María	15690	1972
Santa María	41676	1972
Santa Marta	47001	1972
Sincelejo	70001	1970
Sogamoso	15759	1968
Soledad	8758	1986
Tuluá	76834	1971
Tumaco	52835	1972
Tunja	15001	1985
Valledupar	20001	1971
Villavicencio	50001	1972