[Preliminary version for PAA-07. Not valid for citation]

Long-term Consequences of Adolescent Fertility in Colombia

B. Piedad Urdinola[1] and Carlos Ospino[2]

I. Introduction

Although Colombia's overall fertility rates have steadily decreased since the 1960s, an unexpected increase in adolescent fertility has been observed during the past 15 years. According to the data from Demographic and Health Surveys (DHS) carried out in Colombia, age specific fertility rates (ASFR), for women ages 15 to 19, have increased from 73.4 in 1986 to 84.8 in 2000. Interestingly enough, this increase is not compositional (see Figures 1 to 4 in Annex 1). That is, adolescent fertility has increased in both rural and urban areas, across educated and uneducated, married and unmarried women, and for teenagers living in all geographic regions, except for those in the Atlantic coast.

Three main explanations have emerged as possible causes of this phenomenon. First, social disorganization including the breakdown of effective social and family forms mostly in lower income households, observed also in the American case (e.g. Baumer and South, 2001; Billy, Brewster and Grady, 1994; Manlove et al. 2000, Gaviria, 2000), and particularly true in Colombian cities (Barrera and Higuera, 2003). Second, an increase in premarital sexual activity with lack of knowledge on contraceptive methods and their proper use (Florez and Nunez, 2002). Lastly, a rational shift in fertility timing as a response to socio-economic changes, also observed in Brazil and Dominican Republic (Jhonson-Hanks, et al., 2002).

In contrast, little research has been devoted to the socio-economic consequences of this striking pattern. Yet, what is certain is that this choice is likely to affect the adolescents' socio-economic and personal life as well as health outcomes for their children. These issues are the main interest of this paper.

Two previous studies, using cross-sectional information, find that adolescent mothers in Colombia immediately reach lower educational levels and perpetuate poverty conditions in an already poor family (Gaviria, 2000), or lower their school enrollment rates and labor supply (Barrera and Higuera, 2003). The lack of longitudinal

[1]Assistant Professor at the Department of Statistics, Universidad Nacional de Colombia-Bogotá. bpurdinolac@unal.edu.co
[2] Researcher at Foundation for the development of the Caribbean (FUNDESARROLLO). cospino@fundesarrollo.org.co

surveys in Colombia has not allowed the study of long term consequences of early pregnancies, up-biasing the effects of adolescent fertility as these authors mention on their own studies. Indeed cross-sectional studies on this topic account for educational desertion at the moment of the pregnancy, missing the possibility of reinsertion in the (near) future. Moreover, cross-sectional data do not account for family background heterogeneity across different women, who have babies at different ages. For those reasons, the true effects of earlier pregnancies have not been fully accounted for in Colombia.

This paper, thus, will empirically measure the possible long term effects that these adolescent-mothers may experience by measuring educational, labor market, marriage/cohabitation patterns as well as their children's health outcomes. We propose the use of three DHS carried out in Colombia (1990, 1995 and 2000) to build a pseudo-panel. That is, follow the cohorts of women who were adolescents in 1990, through each of the following DHS until year 2000, when they reach the ages of 25 to 29. We will not use the 1986 DHS survey as it was designed and implemented by a different institution, and has several sampling differences with the rest of the DHS.. Using data until DHS-2000 will give us a lot of insight on this problem as most women do not increase their education after the age of 29 ,in Colombia (less than 3% do it, according to DHS and other household surveys) and most women have their children below age 29 (90% of women).

The treatment group for this study is adolescent mothers, yet the challenge is to find the appropriate control group. As adolescents who become mothers typically self-select, we propose to compare them against those who were 20 to 22 years old. Moreover, we will also narrow the treatment group to women who became mothers in 1990 just below age 20, namely ages 18 and 19. In both cases we will control for socioeconomic characteristics and in this way avoid the bias that pre-existent socio-economic characteristics impose, by the self-selection process described above and in other relevant articles (see section II).xxx

Our preliminary findings show xxx differences in educational and occupational outcomes narrow with time. However, this is not true for marital status or infant mortality. Thus we expect to find that after controlling for pre-conditional socio-economic status there is almost no differences in educational and occupational outcomes. However, there are important differences on the marriage market (being married or cohabitating) and infant mortality. The former result comes as a surprise as

marriage is not common in Colombia anymore (over 55% of couples are currently cohabitating). While the latter contradicts what has been found in developed countries and opens a new research path, as children born to adolescent women have higher probabilities of death, even if they are born after the mother is not an adolescent.

The remaining of this proposal is as follows. Section II includes a brief literature review. Section III presents the research design and data. Section IV has the results, while the last section includes final comments and conclusions.

II. Literature Review

The socio-economic impact of adolescent fertility on these women has captured the attention of scholars around the globe. However, there is little available information to empirically test the different hypothesis, and whenever it is available the main challenge is to design the proper research strategy.

The following approaches coincide in the result that, independently of the research design, cross-sectional analysis up-bias educational and income consequences than longitudinal ones; as adolescent mothers tend to self-select for several socio-economic characteristics. The results of studies using longitudinal data are presented as follows.

Hotz et. al. (2005) define a natural experiment by comparing women who had a miscarriage as teens against teen mothers, using an instrumental variable approach to calculate unbiased estimates of the impact of teenage childbearing. Their study uses data from the National Longitudinal Survey of Youth, 1979 (NLSY79) in the United States of America (USA). Their results are counter-intuitive as they find that the negative effects of adolescent motherhood are much smaller than studies that use alternative methodologies, and that teenage mothers have higher income at older ages than they would have had if delayed pregnancy.

Geronimus and Korenman (1992) exploit the comparison that one can make to sisters who timed their first birth at different ages, including teenage, using the 1982 data from the National Longitudinal Survey of Labor Market Experience Young Women's Cohort (NLSYW), the 1988 data from the National Longitudinal Survey of Labor Market Experience of Youth (NLSY) and the 1985 data of the Panel Study Income of Dynamics (PSID). Two main results are worth taking into account. First, controlling for family background decreases the effects on the socio-economic outcomes related to a teen birth. Second, their research design allows controlling for unobserved characteristics of family background which lower even more the negative outcomes of adolescent motherhood, such as finishing high school, reaching tertiary education, current income and being married, closing the gap in a significant way.

Levine and Painter (2003) take one step further in this type of studies. By comparing pairs of classmates in the same high school and applying matching techniques, they find that adolescent mothers are more prone to having lower educational outcomes. However, most of such effect is explained by pre-existent conditions to motherhood, including lack of knowledge on sexuality and pregnancy.

Another important outcome that has been studied in the literature is the effect that adolescent motherhood may have on marital prospects. Buvinic (1998) reviews four studies in Latin America, finding that teenage childbearing does not affect women's marital prospects negatively. In her survey, she explores the consequences of teen childbearing, describing the differences that emerge from each of the four studies reviewed, to try to determine the importance of background characteristics in teenage childbearing. The Barbados study, uses a sample of 303 women who gave birth between 1983 and 1984, they were interviewed six to eight years after giving birth. The study for Chile used a representative household survey that was carried out in Santiago in 1990, drawing a sample of 505 women. They compared women who had a child at age 19 or younger to those who had them at age 20 or older. The study for Guatemala used retrospective life histories of 850 women, and followed them in three rounds of surveys: 1967, 1974 and 1987. The comparison was made using the same age groups as in the Chile study. The Mexico study also followed a sample of 462 women who gave birth in a major hospital between 1987 and 1989; they were interview four years after giving birth. The comparison was made between women who had given birth before age 18 and those who did so at age 21 or older.

Their results show that adolescents who bore children were not more or less likely than adult mothers to be married in the four countries. Yet, while adolescent motherhood does not seem to carry a social stigma that would affect women's likelihood to find partners and marry, it does seem to be associated with changes in family size (larger families), and family arrangements— more adolescent mothers as boarders; fewer biological fathers as heads and as having financial responsibility for and attachment to the child; and more grandparents taking over responsibility for children. Thus, following this particular result, children of teenage mothers are more likely to live without the father. Mothers expect less educational attainment from them, are less likely to attend pre-school or childcare. These children also had lower scores on language development tests and more behavioral problems. As a result, the teen motherhood cycle tends to repeat itself. In Mexico and Chile adolescent child bearers were themselves born to adolescent mothers. Two thirds of adolescent mothers in Mexico had mothers who also gave birth in their teen years, suggesting that adolescent motherhood can be learned and transmitted within families.

On the contrary, in the English society Ermisch and Pevalin's (2003) results suggest little adverse impact of a teen-birth on woman's qualifications, employment or

pay at age 30. But the estimated bounds indicate that the partner she is with at age 30, if she has one, is more likely to be unemployed. By using data from the British 1970 Cohort Study and following the methods developed by Hotz et al (1997) they find that women having a teen-birth appear to fare worse in the 'marriage market', in the sense that they partner with men who are more likely to suffer unemployment. Having a teen-birth also tends to reduce the probability that a woman is a homeowner at age 30.

Other set of documents can only exploit cross-sectional data. Although, authors are aware that it up-biases the results, their main findings still point out that adolescent mothers tend to self-select by several socio-economic outcomes. However, their data constraints do not allow full measurement of long term consequences. For instance in Colombia, Gaviria (2000) uses information from the Social Survey-2000 (household survey carried out in urban Colombia), to measure the role of socio economic characteristics on the probability of becoming pregnant, using a linear probability model. The author also performs the Oaxaca decomposition to measure how much of the differentials in pregnancy rates between poor and non poor, is attributable to sexual activity and the propensity of becoming pregnant. He finds teenage pregnancies reduce educational attainment and as a result these women have low expectations for social mobility. His results suggest that in urban Colombia differences between poor and non-poor teenagers are not associated with knowledge or access to birth control methods, but rather with more deliberate decisions associated with low socioeconomic expectations. The policy implication, thus, is to move into the line of raising economic and social mobility expectations, to increase the opportunity cost of becoming pregnant early in life.

Florez and Nunez (2002) examine teenage fertility trends using DHS surveys for Bolivia, Brazil, Colombia, Guatemala, Dominican Republic and Peru for the second half of the 1990s. They find that teenage fertility (TF) trends have been different across countries and across regions. In all countries rural areas experienced an increase in TF, but it was not necessarily the case in urban areas. Bolivia and Guatemala show little change in both urban and rural areas, remaining as the two countries with the highest teenage fertility levels. Also the proximate determinants of TF vary across countries. For instance in Peru postponement of marriage, intercourse patterns, high acceptability and use of family planning methods has helped to the decrease of TF. In Brazil and Colombia, although contraception is widely spread among adolescents, teenage fertility

has increased as a consequence of increasing intercourse patterns, mostly before marriage, whereas marriage patterns has had no-effects.

Finally, Florez et. al. (2004) follow Simmons' (1985) conceptual framework. Namely, socioeconomic and context factors affect both the level and timing of adolescent fertility through proximate determinants, by taking into account the influence of peers, couples, parents, teachers, and the media with regards to sexual activity, dating and pregnancy. The study focuses on decisions adolescent girls make about becoming sexually active, first pregnancy and first birth for two Colombian cities: Bogota and Cali. Their data show that adolescents living in high socio-economic strata spend most of their teen years studying, while most adolescents from low strata start engagements (marriage or consensual unions), motherhood and employment at these early ages.

Their study also shows that adolescents become sexually active around age 15, but only 55% to 65% used any family planning method during their first sexual intercourse. Qualitative analyses on the data showed that teenagers have unfounded beliefs about use of family planning, reflecting the lack of knowledge on the topic. And this lack of information is more spread in women living in more disadvantaged households. More importantly, the authors do not find any effect on the exposure to sexual education in the schools, but the contextual household factors such as previous teenage fertility in household, sexual abuse to the adolescent, physical and/or verbal abuse, low level of communication with the mother, lack of supervision and a favorable perception of early sexual activity have a positive effect on the likelihood to start sexual relations, both in Bogota and Cali.

In summary, teenage fertility literature has followed several methodological approaches to determine the impact of this phenomenon on the lives of mothers. Yet, there is consensus in two issues. First, most of the effect on education and income is attributable to background characteristics or self selection; meaning these women would still be worse off even if they had not had a baby while being adolescents. Second, cross-sectional data increases this bias even more. Once those two facts are taken into account, results are mixed on the outcomes on education, wages and the probability of being married, depending on the type of data and population under study. Nonetheless, several critiques arise on the inadequate control group used on the studies cited above. In some cases, because there are large differences on the two groups, then the comparison is null for causality purposes. In other cases the empirical test hardly meets statistical criteria, due to very small samples. For instance, choosing sisters or

comparing miscarriages have this type of problem, as it is very hard to match this type of pairs in sample surveys, resulting with very little observations for the analysis.

For those reasons, and the following in the next section, the research strategy we chose incorporates such critiques and tries to correct them by, on one hand, choosing the appropriate control group. And, on the other hand, using the construction of the pseudo-panel and all observations included in the survey to keep statistical confidence.

III. Research Strategy

As there is no longitudinal data available for Colombia, there are no previous efforts to prove the long-term effects of adolescent motherhood. Our approach is the construction of a pseudo-panel from the random samples of women in their reproductive years, as drawn by DHS surveys carried out in Colombia in 1990, 1995 and 2000. Thus, for each survey we will follow single-aged cohorts starting as adolescents in 1990 through those years.

As we are mostly interested on matching by preexistent characteristics, and the surveys only have household information from the household women live at the moment of the survey, matching by those conditions was impossible. Yet, cross-sectional data showed that only considering age and motherhood simultaneously is enough to control for such characteristics, as pointed out by previous studies in Colombia. Indeed, Table 1 shows for the most powerful proxies of socio-economic conditions, mother and father's education, that the difference between adolescents who became mothers come from very disadvantaged households, and such differences are highly significant (99%).[3] In 1995, the difference in years of education of the fathers to adolescent mothers is 2.55 years below, compared to fathers whose daughters have not had a child yet; and 1.82 years in 2000. The same differences for mother's education show a distance of 1.62 years and 1.51 years in 1995 and 2000, respectively.

Other household characteristics are included and among them household head's years of education show the same pattern, as well as Wealth Index.[4] The same result holds for older adolescents (ages 18 and 19 only), and it even exacerbates as cohort characteristics show more similarities for these women (i.e. household head's age and education, parents' education, shown in Annex 1).

[3] Women for these comparison only include adolescents living in their paternal home: daughters, grand-daughters, adopted or foster child and sisters. Adolescents who were partners or household heads are not considered.

[4] DHS surveys do not include information from income or expenses per households. Thus, MacroInternational (the firm that carries out the surveys) have created a Wealth Index using the different household characteristics and possession of assets. For more details on the construction of the index www.measuredhs.com can be consulted: "DHS Comparative Reports No. 6. The DHS Wealth Index"(Shea Oscar Rutstein and Kiersten Johnson, August 2004)

Table 1. Pre-existent Socio-Economic Conditions. Differences in Means and Proportions for Adolescents (ages 15-19) from Cross-Sectional Data. 1990, 1995 and 2000 in Colombia

	1990		1995		2000	
	Non-Adolescent Mothers	Adolescent Mothers	Non-Adolescent Mothers	Adolescent Mothers	Non-Adolescent Mothers	Adolescent Mothers
Mother's single years of education	NA	NA	5.49*	3.87*	5.77*	4.26*
Father's single years of education	NA	NA	5.35*	2.80*	5.70*	3.82*
Household head's single years of education	5.76*	4.26*	5.40*	3.75*	5.89*	4.25*
Household head's male	76.61%*	66.92%*	75.30%	70.83%	69.69%*	59.9%*
Household head's age	47.52	49.44	48.29	48.54	47.99	48.37
Living urban	88%	88.24%	76.07%*	63.1%*	75.44%*	66.83%*
Wealth Index	0.076*	-2.39*	0.006	-0.085	0.13*	-0.162*
N	1526	130	1567	168	1600	202

Only adolescents who are daughters, grand-daughters, sisters or other relatives are considered. Except for mother and father's education.
*Difference Statistically Significant.

The construction of the cells for this pseudo-panel was made by identifying the ages and motherhood status and grouping them into the same cells, through the years. These cell construction corresponds to the pseudo-panle data, in which each sample unit in each year is not an individual adolescent, but a cell. Then, the average of all variables of interest are cell averages. The nature of the data allows us to make such construction as the data comes from random samples for each year of the survey, and each sample is representative of Colombian population. Deaton (1985) has proved that this type of data may be used for estimation models considering the average of variables as information coming from a panel. Further, a pseudo-panel helps reduce the attrition problem, very common in longitudinal surveys, and controls for expectational errors, by averaging them out. Finally, and quite importantly for our case, it avoids the need to control for individual effects , as it aggregates across them.

With such information we will try to prove the effects, if any, on two sets of outcomes. The first set refers to three women's outcomes that will be measured following Equation (1):

$$Womens'outcome_{i\tau} = \theta a_{i\tau} + \beta x_{i\tau} + \varepsilon_{i\tau} \quad (1)$$

The dependent variables (*Womens'outcome*) are employment (whether the woman is employed or not), educational attainment measured by single years of education and marital status and each will depend on the fact that the mother *i,* who

belongs to the cohort τ, had her first child while being adolescent captured by the estimator θ, controlling for other individual characteristics included in vector x and captured by estimators β. The first two outcomes account for proxies of womens' success or failure on their market skills. We expect to find lower unemployment rates for adolescent mothers, as they have to look out for a job earlier to economically support their child.

The second outcome, educational attainment, is not only a job market indicator, but also a proxy for individuals' income, as it is not recorded in the survey. Women's education is also the most important determinant on infant mortality and infant health in Colombia (Urdinola, 1998; 2004) and is strongly correlated with their partners' education (*assortative mating*), which in turn will determine household's income, its redistribution within household members and health preferences for children in the household.

The last of the women's outcomes, marital status, accounts for the success/ failure on family formation for adolescent mothers. As Colombia has experienced profound social changes during the second half of the 20th century, we expect to find little effect on this issue. That is, until the 1950s women had children at younger ages, but mostly were conceived under marriage, as children born out of wedlock were socially segregated (among others could not carry their father's last name, were not accepted at school or Catholic church, did not have the same legal protection as their half-brothers born in marriage).[5] Also, adolescent unmarried mothers were not allowed to continue studying, and most of them were denied at their paternal homes, and the father of the child typically did not marry the young mother.

Yet, since the 1970s Colombia has suffered dramatic social changes, particularly on this matter. For instance, by that decade almost all couples were formed in marriage, while by the turn of the millennium more than 60% of Colombian couples live in cohabitation (Florez, 2000), and children born from those family formations are not socially segregated any more. In fact, the society has changed so much in this respect that even legislation has reacted to those changes. As for today Colombian couples formed from cohabitation *and* that have lived together for two or more years have the same legal obligations and benefits of any married couple, for each member of the couple and the children born from that family arrangement. Also, by law adolescents

[5] Colombian population is mostly Catholic, Up until 1980 over 90% of total population was Catholic.

who become pregnant cannot be expelled from private or public schools any longer (Laws: *Sentencia T-772/2000, Sentencia No. T-211/1995, and T-543 from 1995).*

The second set of outcomes refers to children's outcomes, which will be measured following Equation (2):

$$Health_{ij\tau} = \theta m_{ij\tau} + \alpha z_{ij\tau} + \beta x_{i\tau} + \varepsilon_{ij\tau} \quad (2)$$

Those outcomes are basically health indicators of children *i* born to mother *j* who belongs to cohort τ. Two indicators are available from DHS data: infant mortality and birth weight. Similarly to the previous equation, the effect of teenage motherhood will be captured by θ, controlling for individual characteristics of the child *i*, measured by the vector of characteristics *z* and capture by the estimators α; and individual characteristics of mother, summarized by the vector *x* and captured by estimators β. The main indicators from the DHS questionnaire allows to construct mortality indicators and birth weight, as it is one of the best predictors of future health and even motor and intellectual development of children in future years.

A. The Data

The DHS has been designed to capture information, among other topics, on health programs, contraceptive use, fertility, infant and maternal mortality and nutritional status. The DHS survey targets households, collecting information of women in their reproductive ages (12 to 50 in Colombia) and their children born in the previous five years. It also collects several anthropometric measures, vaccination coverage and nutritional status of both mothers and their children, all of them very relevant for this particular study. Moreover, it accounts for a series socio economic variables of these women and their households, as well as the basic demographic variables. Colombia is one of the few Latin American countries with several DHS implemented every five years since 1990, being 2005 the last survey. This allows the construction of a pseudo-panel, satisfying the statistical conditions for it.

B. Treatment and Control Groups

We will primarily focus on women ages 15 to 19 years old. However, the heterogeneity just within these ages creates a conflict when wanting to compare them to older women (i.e. differences between a 15 and a 23 years old are radical). Thus, we

propose to narrow both the treatment (adolescent mothers) and control groups (mothers who postpone motherhood for a couple of years only).

By exploiting the natural discontinuity around age 20, this study compares the outcomes of interest of teenage mothers and their children with, on average, very similar socioeconomic characteristics. Thus. we take contrast women who became mothers in 1990 being 18 or 19 years old, against those who did it at ages 20 to 22 and follow them through the decade.

This control group proves to be a more suitable one for the Colombian case, as other socio economic characteristics do not significantly differ, and as the following Tables show.[6] The same calculations were made using as a control all women who postponed their first birth after the age of 20 in year 1990, just to have it as a reference, since those women totally differ from adolescent mothers and are not a real control for the purpose of this document, as well as including all adolescents back to age 15, with similar unwanted results.

Table 2. Difference in Household Head's Average Years of Schooling (t-test) for Treatment and Control Groups

	1990		
	Obs.	Average	t-test
Treatment (18-19)	46	4.866	
Control (20-22)	116	6.017	
Difference	162	-1.150	-1.66
	1995		
	Obs.	Average	t-test
Treatment (18-19)	138	6.086	
Control (20-22)	263	6.449	
Difference	401	-0.362	-0.85
	2000		
	Obs.	Average	t-test
Treatment (18-19)	134	5.755	
Control (20-22)	231	6.843	
Difference	365	-1.087	-2.59

[6] Several characteristics are compared and we keep only observations where the household socio-economic characteristics do not drastically differ. Among such characteristics we include: household head gender, family size, number of children below age 6 in the household, access to health care services, access to public services (water, electricity, toilet conditions), household head occupation, property of goods such as motorcycle, refrigerator, TV, and the like.

Table 3. Difference in Wealth Index for Treatment and Control Groups

	1990		
	Obs.	Average	t-test
Treatment (18-19)	47	-0.291	
Control (20-22)	116	-0.130	
Difference	163	-0.161	-0.93
	1995		
	Obs.	Average	t-test
Treatment (18-19)	141	-0.054	
Control (20-22)	270	0.133	
Difference	411	-0.187	-1.95
	2000		
	Obs.	Average	t-test
Treatment (18xb-19)	134	-0.105	
Control (20-22)	231	0.078	
Difference	365	-0.183	-1.79

IV. Empirical Results

A. Descriptive Statistics

Our descriptive statistics using cross-sectional data, show little differences on education. For instance Table 1 shows the differences in years of schooling for adolescent mothers in 1990 (Treatment) and all women who became mothers at age 20-22 (Control). To begin with, on average the difference in years of schooling by 1990 is 2.4 years. However, this difference decreases in 1995, and the gap narrows to 0.75 years by 2000, where the difference is not statistically significant at the 95% level of confidence. As expected, the trends are similar when educational attainment is measured by educational categories (not shown).

Table 4. Difference in Average Years of Schooling for All Treatment and Control Women, 2000

		1990	
	Obs	Average	t-test
Treatment	47	5.575	
Control	116	7.680	
Difference	163	-2.104	-3.96
		1995	
	Obs	Average	t-test
Treatment	141	6.684	
Control	270	7.666	
Difference	411	-0.981	-2.9
		2000	
	Obs	Average	t-test
Treatment	134	6.482	
Control	231	7.241	
Difference	365	-0.759	-1.95

Figure 2 shows a different story for unemployment. The proportion of employed women starts very similar in 1990 and as time passes by the gap increases in favor of mothers who postponed maternity for a couple of years, but the difference is only significant for year 2000, which shows a critical position on this matter for adolescent mothers.

Figure 1 Average years of schooling for treatment and control women

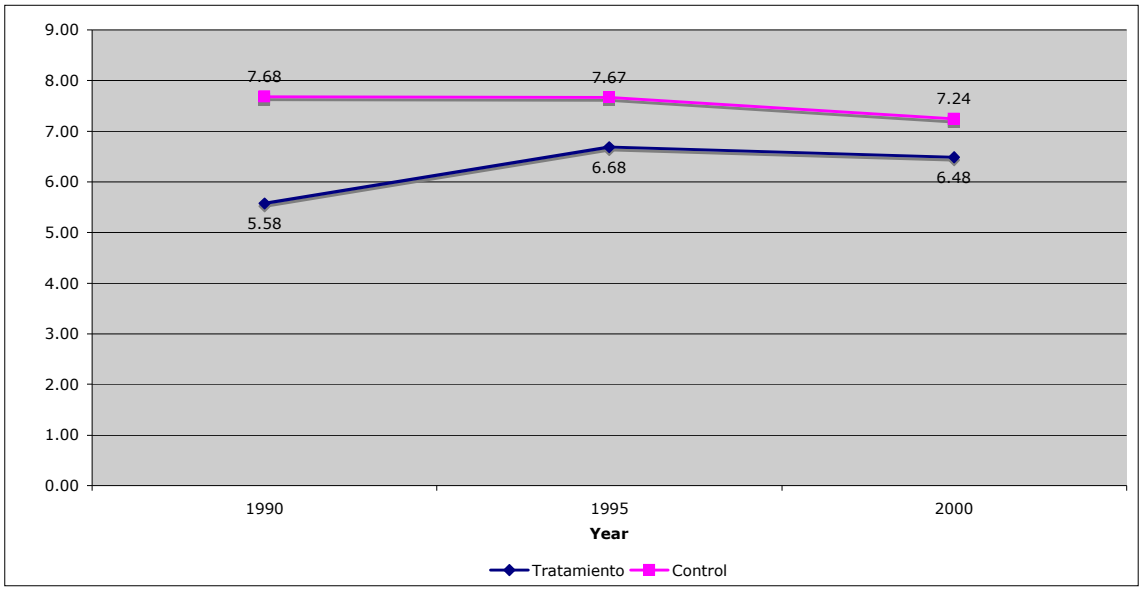
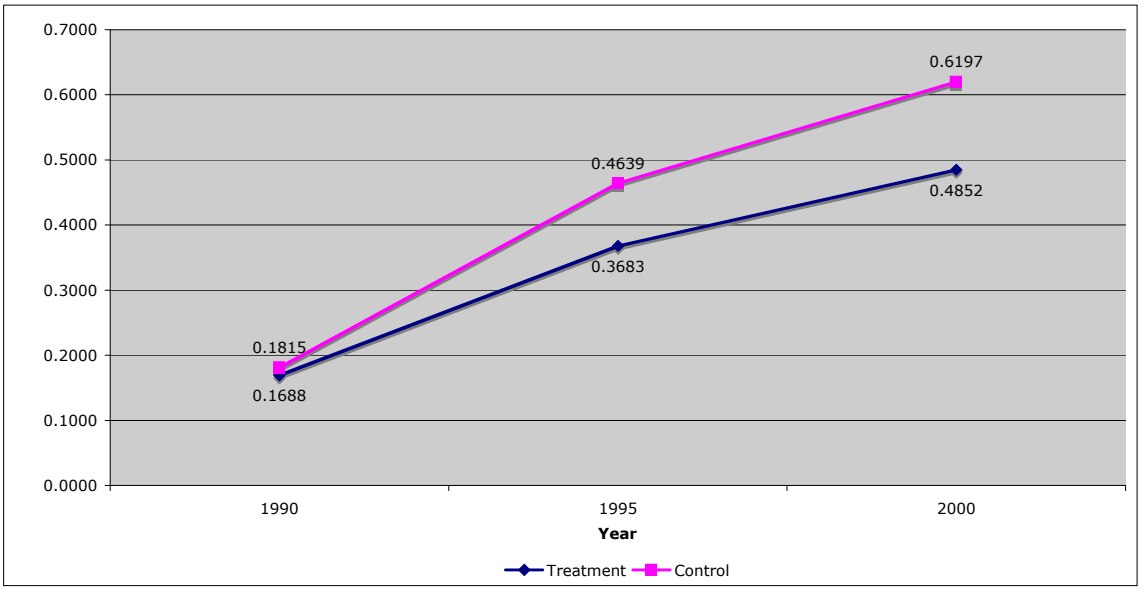


Figure 2 Proportion of employed women



The marriage market descriptive statistics took us by surprise as most couples in Colombia are currently under the 'living together' category. And, as we can see in Figures 3 and 4, adolescent mothers start with lower proportions of women cohabitating in 1990. But, as time passes by more of them begging such kind of unions, while counterparts tend to marry more and cohabitate much less.

Finally, Table 5 shows that the proportions of surviving children do not vary much for women who became mothers by age 20-22, but instead it increases with time for

adolescent mothers. Unfortunately, this increase is over 3 percentual points, creating a large gap on their children's survival. Thus, although several medical papers have not found remarkable differences in the health outcomes of children born to adolescent mothers, there may be health differences in their children, even if they are not born while the mother is still a teenager.

Figure 3 Proportion of women living in cohabitation

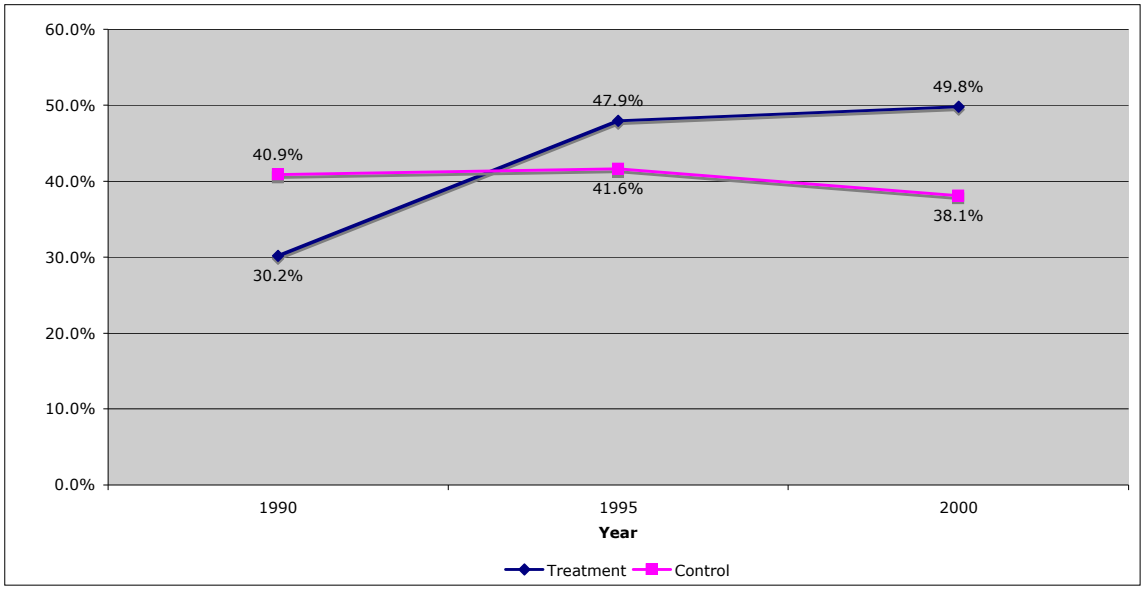


Figure 4 Proportion of women never married

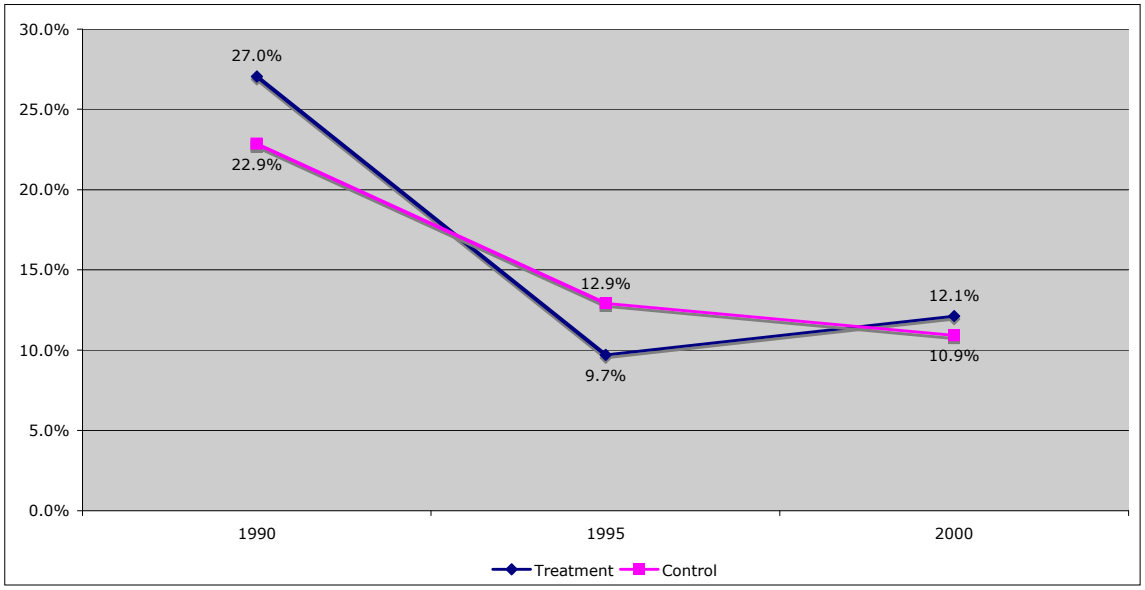
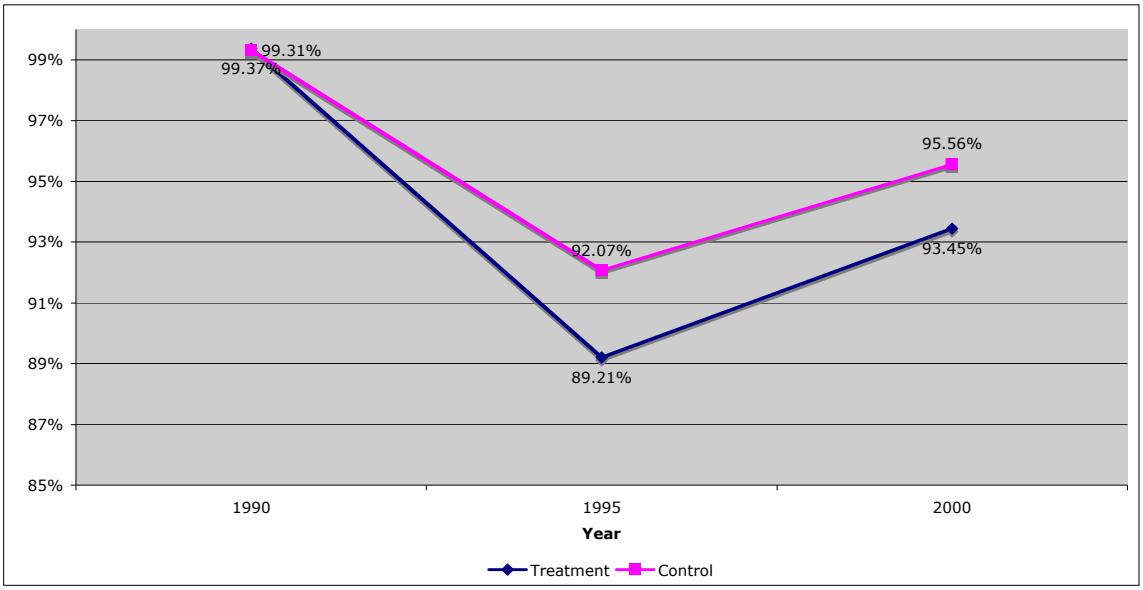


Table 5. Proportion of Surviving Children from All Treatment and Control Women, 1990-2000

	1990	1995	2000
Treatment	99.05	89.21	93.45
Control	99.40	92.07	95.56
Difference	-0.36	-2.86	-2.11

Figure 5. Proportion of Surviving Children from All Treatment and Control Women, 1990-2000



B. Regression Results

Table 6 shows the results following the proposed methodology presented in the previous section on labor market outcomes. As we can see average years of education increases for adolescent mothers, compared to women who postponed motherhood for a couple of years. The results are significant and robust when we also control for Wealth Index. On employment, we also find a positive but much smaller effect for adolescent mothers. These results matches those of preliminary studies carried out in other countries such as the United States.

Table 6. Long-Term Effects on Educational Outcomes for Adolescent Mothers (ages 18 and 19) Compared to Non-Adolescent Mothers (ages 20-22) in Colombia.

	Years of Education				Employment			
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
Teen Mom	6.386	0.170	6.363	0.215	0.372	0.018	0.121	0.035
Schooling							0.046	0.003
Wealth Index			-0.106	0.476			0.214	0.098
No. Obs.	15		15		15		15	
No. Groups	5		5		5		5	

The results on marital status follow very much the descriptive statistics. Table 7 shows that adolescent mothers have a higher probability of living in consensual unions or never marry, when compared to young women who postponed motherhood. The result holds when controlling for other characteristics, although the magnitude decreases.

Table 7. Long-Term Effects on Marital Status for Adolescent Mothers (ages 18 and 19) Compared to Non-Adolescent Mothers (ages 20-22) in Colombia.

	Unions				Never Married			
	Coefficie	Std. Err.	Coefficie	Std. Err.	Coefficie	Std. Err.	Coefficie	Std. Err.
Teen Mom	0.478	0.021	0.123	0.056	0.188	0.004	0.037	0.040
Schooling			0.050	0.006			0.024	0.003
Wealth Index			-0.166	0.183			0.018	0.136
No. Obs.	15		15		15		15	
No. Groups	5		5		5		5	

Table 8. Long-Term Effects of Child Mortality for Adolescent Mothers (ages 18 and 19) Compared to Non-Adolescent Mothers (ages 20-22) in Colombia.

	Child Mortality			
	Coefficient	Std. Err.	Coefficient	Std. Err.
Teen Mom	0.055	0.002	0.063	0.006
Schooling			0.003	0.001
Wealth Index			0.130	0.026
No. Obs.	15		15	
No. Groups	5		5	

Finally, the results on the proportion of children death to adolescent women are not as optimistic as the labor market results. On average adolescent mothers have a higher probability of experiencing a dead when compared to non adolescent mothers, as shown

in Table 8. Unfortunately, this probability increases as other important variables, as years of education, are included.

In summary, adolescent mothers in Colombia tend to perform as well as those who postponed motherhood for a couple of years in labor market indicators. However, and contrary to our original hypothesis, they do marry less and their children have higher chances of dying. The policy implications of these results are important in two senses. First, several public programs target single mothers or female household heads as beneficiaries of subsidies; this fact may be generating our observed results on marital status. Second, if it is true that children born to adolescent mothers have higher probabilities of child mortality, thus medical services and other public health programs should pay more attention to this fact. As one of the goals of the millennium seeks the reduction of infant mortality rates, this could be a major finding if Colombia wants to pursue this goal.

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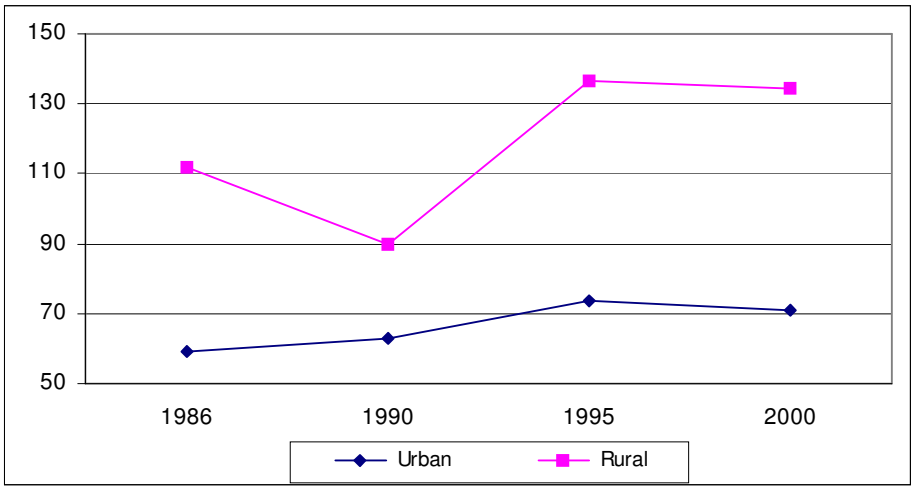
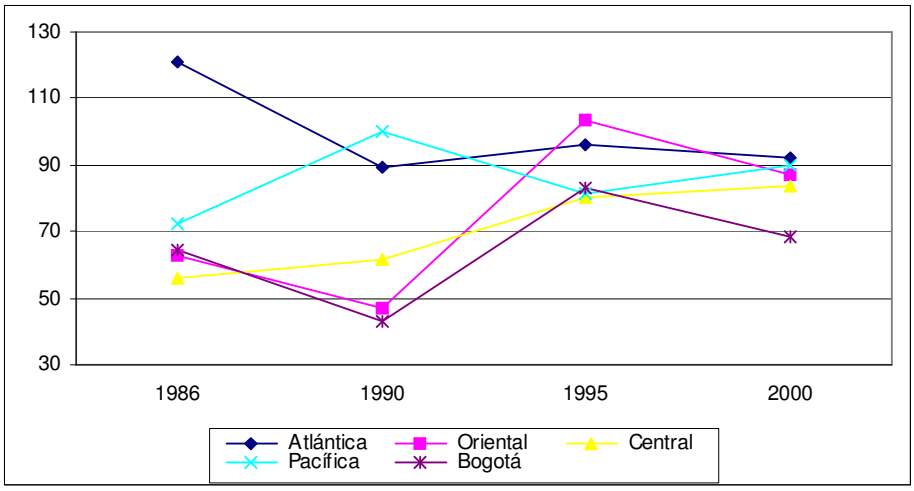
Annex 1.

Figure 1. Age Specific Fertility Rates (ASFR) for Ages 15 to 19 in Colombia by Rural/Urban Residency. 1986, 1990, 1995 and 2000



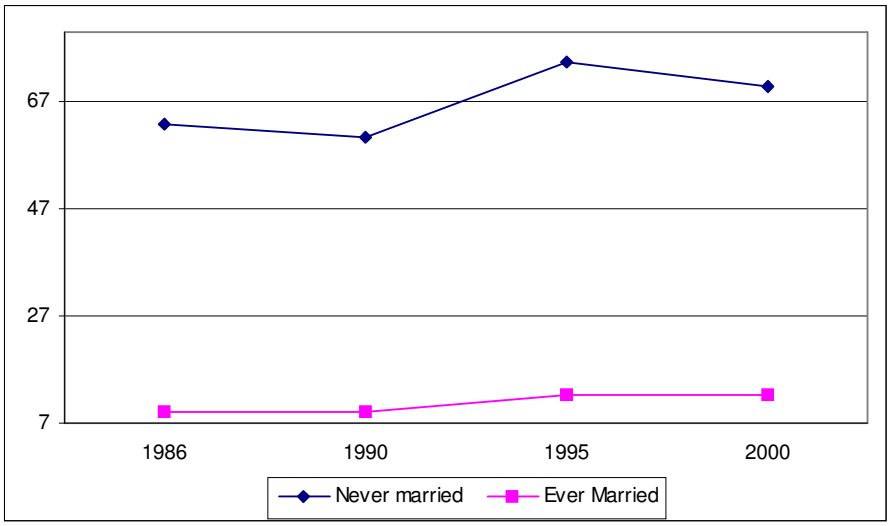
Source: DHS-Macroint.(Stat compiler - http://www.measuredhs.com/statcompiler)

Figure 2. Age Specific Fertility Rates (ASFR) for Ages 15 to 19 in Colombia by Geographic Region. 1986, 1990, 1995 and 2000



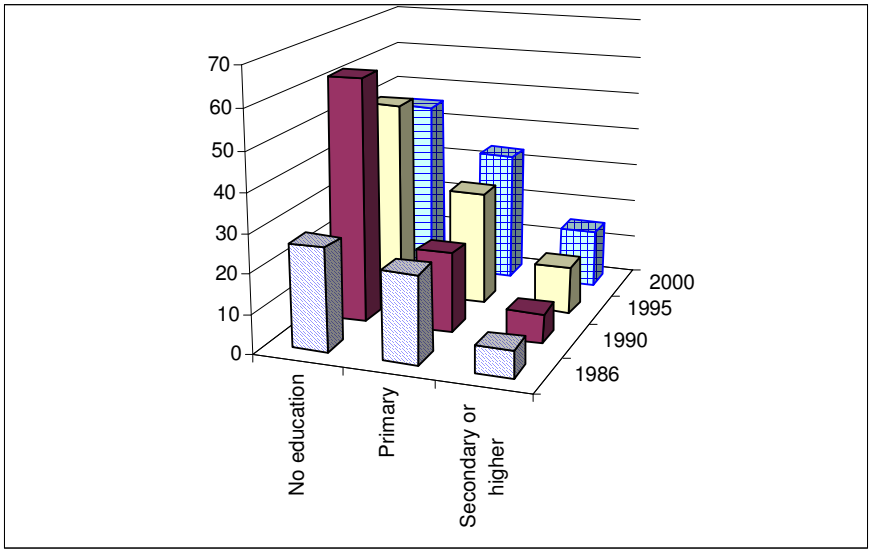
Source: DHS-Macroint.(Stat compiler - http://www.measuredhs.com/statcompiler)

Figure 3. Age Specific Fertility Rates (ASFR) for Ages 15 to 19 in Colombia by Marital Status. 1986, 1990, 1995 and 2000



Source: DHS-Macroint.(Stat compiler - http://www.measuredhs.com/statcompiler)
*Ever married includes: married, separated/divorced and widows

Figure 4. Age Specific Fertility Rates (ASFR) for Ages 15 to 19 in Colombia by Educational Categories. 1986, 1990, 1995 and 2000



Source: DHS-Macroint.(Stat compiler - http://www.measuredhs.com/statcompiler)

Table 1. Pre-existent Socio-Economic Conditions. Differences in Means and Proportions for Older Adolescents (ages 18-19) from Cross-Sectional Data. 1990, 1995 and 2000 in Colombia

	1990		1995		2000	
	Non-Adolescent Mothers	Adolescent Mothers	Non-Adolescent Mothers	Adolescent Mothers	Non-Adolescent Mothers	Adolescent Mothers
Mother's single years of education	NA	NA	5.41*	3.73*	6.11*	4.38*
Father's single years of education	NA	NA	5.71*	2.94*	5.97*	4.01*
Household head's single years of education	6.14*	4.11*	5.77*	3.98*	6.35*	4.34*
Household head's male	77.22%	70.59%	78.83%	71.28%	55.81%*	65.92%
Household head's age	48.4	48.51	49.6	48.06	48.17	49.13
Living urban	88.19%	92.54%	78.11%*	64.89%*	81.36%*	68.99%*
Wealth Index	0.172*	-0.173*	0.04	-0.21	0.297*	-.105*
N	474	68	466	94	537	129

Only adolescents who are daughters, grand-daughters, sisters or other relatives are considered. Except for mother and father's education.
*Difference Statistically Significant.