Progresa, Early Childbearing, and the Intergenerational Transmission of Poverty in Rural Mexico

Introduction

Mothers play a central role in shaping the prospects of their children with regard to health and schooling. It makes intuitive sense that the children of mothers who give birth very early might face certain disadvantages compared to their peers whose mothers gave birth later. The reasoning is that early childbearers may have less human capital to pass along to their children, since their own exposure to schooling and employment opportunities are constrained by early motherhood. The research on these effects is somewhat ambiguous, however. Studies on the effects of early childbearing in the United States have shown that children of early childbearing mothers often fare less well in educational attainment than children whose mothers started having children later, but that welfare and high-school equivalency programs for adolescent mothers help them (and their children) catch up (and for some indicators surpass) their later-childbearing counterparts. Recent welfare reforms in the US appears to have undermined this capacity to overcome the negative impacts of early childbearing (Maynard 1997; Hoffman 1998).

This paper addresses two questions: (1) whether children in rural Mexico who were born to mothers who had their first births at age 17 or younger were less likely to enroll in secondary school than children whose mothers started childbearing later and (2) whether Mexico's conditional cash transfer program Progresa[1] helped children of early-childbearing mothers catch up to children of later child-bearers. The paper employs data from the panel survey that was used to evaluate Progresa. The paper also discusses issues that arise when a dataset that was designed for the specific purpose of assessing the impact of Progresa is employed to study demographic outcomes affected by the program but not specifically addressed in the design of the panel survey. Data from the Progresa baseline surveys conducted in 1997-1998 are used to address the first question and are combined with data from the November 2000 survey to address the second.

Early marriage and childbearing, the link to intergenerational transmission of poverty.

The linkage between early childbearing and poverty has been the object of considerable research in the United States, where it was found that public policies (including welfare and schooling programs) helped to mitigate the impact of early childbearing on poverty. It is often asserted that early marriage and childbearing contribute to poverty transmission in developing countries, but the evidence base to support these assertions is comparatively thin (Greene and Merrick 2005). Early marriage and early childbearing are important markers for the intergenerational transmission of poverty (Mathur, M. et al. 2003). Low educational attainment is a also key factor in the transmission of poverty from one generation to the next.

Concerns about early childbearing in poor countries are similar to those voiced in the US literature—the risk of inter-generational transmission of poverty via its impact on a woman, her own and her children's health and education, and their life options. As Lloyd notes in a recent U.S. National Research Council report on youth issues, early childbearing could have a range of potential consequences. These include "premature exit from school, reduced earnings prospects, reduced chances of community participation and acquisition of social capital, a heightened

[1] Progresa was developed in the mid-1990s as the centerpiece of Mexico's poverty reduction effort. It replaced a broad array of subsidies with cash payments that were conditioned on specific behaviors such as school attendance and utilization of health services. It was renamed Oportunidades in 2002. Since this study focuses on the period prior to 2002, it refers to the program as Progresa

possibility of divorce or single parenthood, and a greater risk of living in poverty" (2005: 507). But she and her colleagues argue that while the suggestion that early childbearing causes negative outcomes "is certainly a plausible hypothesis, there is insufficient evidence to make this assertion" (2005: 523). They note that the data are thin and that existing studies for the most part lack statistical rigor. Studies have generally used retrospective data to compare adolescent mothers, both single and married, to women who have their first births at older ages. The risks are greater for girls, who bear the primary responsibility for child care, which seems to coincide with "shrinking opportunities and reduced scope for independent action" (Lloyd 2005).

Echoing the US debate, generalizations about these concerns for developing countries have been challenged for several reasons. First, the disadvantages of early parenthood may be transitory and young mothers may overcome them over time; second, negative outcomes of early childbearing may result from associated conditions such as poverty, and these women may fare poorly even if they delay childbearing (Buvinic 1998); and third, early childbearing's association with so many other factors – unwantedness, "illegitimacy," a lack of pre- and post-natal support, social stigma, and little social and material support – makes the effects of maternal age on child health outcomes unclear (Zabin and Kiragu 1998). As Gage (1998) notes, "the cultural and social circumstances surrounding adolescent fertility are so diverse that they defy generalization."

For the US, further research, including re-analysis of data from the National Longitudinal Survey (NLS), supports the view that children born to teen mothers suffer disadvantages. Haveman, Wolfe and Peterson (1997) found that these children were more likely to grow up in poor and mother-only families, live in a poor or underclass neighborhood, and experience high risks to both their health status and potential school achievement. These findings are supported by Levine, Pollack et al. (2001), who do not dispute *that* children of teen mothers perform less well in school and exhibit more problem behaviors (truancy, early sexual activity) but rather question *how* the causal link between these outcomes and early childbearing operates once the background characteristics of their mothers are controlled. In summing up findings from analyses of the NLS, Maynard (1997) observed that even if there is little difference in the economic welfare of teen mothers themselves, there are adverse consequences for the children and the costs to society are substantial. However policies to reduce those costs need to go beyond delay of childbearing and address the full range of risk factors associated with it.

Progresa: what it is, how it works, what evaluations have shown about its impact.

Progresa was a Mexican government program aimed at reducing poverty in households. It was renamed Oportunidades in 2002 and continues to operate with that name. Targeting its benefits directly to the population in extreme poverty in rural areas, Progresa aimed to alleviate current and future poverty levels through cash transfers to mothers in households (Levy 2006). Cash transfers were conditioned on regular school attendance and visits to health care centers. At the end of 1999, Progresa covered approximately 2.6 million families, representing one ninth of all families in Mexico; the beneficiaries comprised about 40 percent of all rural families. At that time, the program operated in almost 50,000 localities in more than 2,000 municipalities and 31states (Skoufias 2005). The average total cash transfer was $55 (US) per month, which represented over a fifth of average family income (Skoufias and Parker 2000).

As noted, low educational attainment has been a key factor in the transmission of poverty from one generation to the next. Mexico's conditional cash transfer program sought to break this cycle by providing cash incentives to poor families who keep their children in school. Evaluations of Progresa have shown that educational grants helped to improve the rate of secondary school enrollment for children who had completed primary school, especially for girls. Schultz (2004)

found that average secondary enrollment across the first three post-program rounds of the panel survey was an increase of 9.2 percentage points for girls and 6.2 percentage points for boys. Further evaluations (Behrman, Sengupta et al. 2005; Parker, Behrman et al. 2005) confirmed that children in beneficiary families experienced more rapid progress in schooling. When repetition rates, dropout rates, and reentry rates were considered in addition to enrollments, the gender balance in the improvements shifted in favor of boys. The evaluations also reported that girls were more likely than boys to drop out after completing primary school and that female dropouts were less like to reenter school. The later findings also showed a decrease in early marriage among daughters.

The Progresa evaluation data: issues such as which mothers/children, family roster, attrition, shrinking of the control group.

The paper employs panel survey data generated for the evaluation of Progresa to assess the effect of transfers in mitigating the adverse effects of early childbearing on educational attainment of children of mothers who had first births before age 18 compared to children of mothers whose first births occurred at age 18 and older. The survey includes baseline data that were collected in 1997 and 1998, plus follow-up surveys conducted in 1999, 2000, and 2003. The original impact evaluation survey included 506 rural localities in seven Mexican states: Hidalgo, Puebla, Guerrero, Veracruz, Michoacán, San Luis Potosí and Querétaro, with 320 in the intervention group and 186 in the control group. Starting in 1999, a number of the 186 control localities were progressively incorporated into the program, so that by the 2003 survey the original control group no longer existed (INSP México 2005).

The survey poses a number of challenges for this analysis. There was no question on age at first birth in the 1997-1998 baseline surveys, but the question was included in the November 1999 follow-up survey. The survey design also makes it difficult to link children in households to their mothers in the case of households that include women who have had children (daughters in law, cousins, etc.) who are not spouses of the head of household or are themselves household heads. For these reasons, the study population consists of children of mothers whose spouses were heads of households (or were themselves heads) and who could therefore be identified and matched in the baseline and 2000 survey rounds.

Attrition is another serious problem. By the end of the November 2000 round of the panel survey, approximately 16 percent of households and 22 percent of individuals originally interviewed in the fall of 1997 were no longer in the survey (Parker and Teruel 2005). Eighty percent of the attrition was caused by migration or change of residence, and the rest to non-response and deaths. Progresa evaluators have tried to track movers and found they were significantly different in terms of non-labor income and schooling. They also found that attrition differed between payment and control group, which undermined the randomization that the survey design sought to achieve, and called for further analysis of the effects of attrition on evaluation results.

Supply-side factors also need to be considered in assessing the impact on secondary enrollment. Progresa was a demand-side intervention. Progresa localities were supposed to have access to secondary schools, but the distance to schools varied. Early evaluations revealed that distance to school affected attendance. Between 1997 and 2003 there was also a substantial increase in the supply of "telesecundaria" schools, where lessons were taught via television with guidance by teachers with somewhat lower qualifications than regular secondary school teachers. Many of the added attendees in 2003 were enrolled in these schools, raising questions about how much of the improvement in progression to secondary school should be attributed to the demand incentive and

how much to the increased supply of schools, as well as doubts about the quality and meaning of this type of schooling.

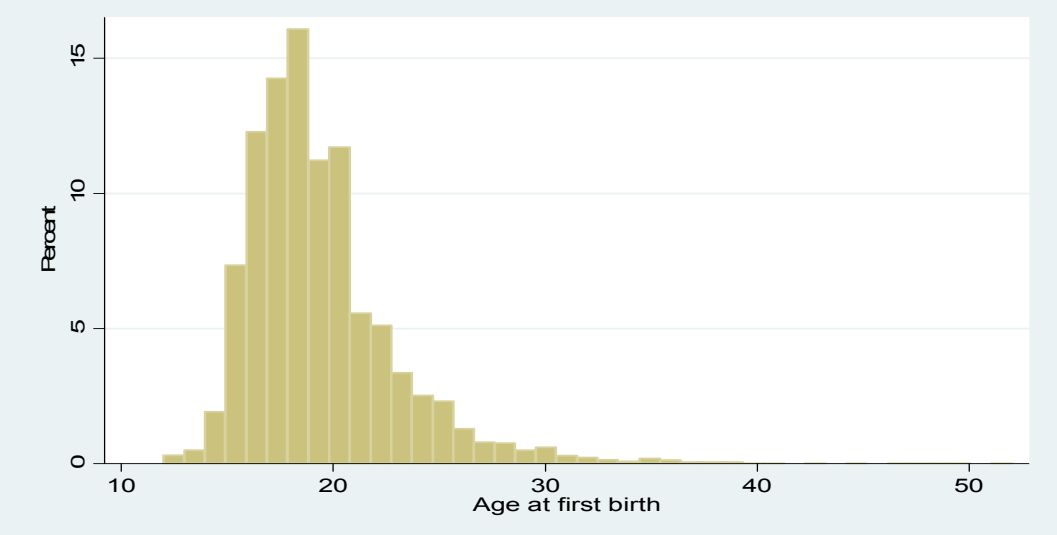
Early childbearing in the study population: how early vs. late birth mothers compare

In this study, women who had their first birth at age 17 or younger are considered "early childbearers", while those whose first birth was at age 18 or over are labeled "later childbearers." "Early" and "late" in reference to the initiation of childbearing are culture and context specific. As Stern (2002) notes, childhood comes to an end fairly early (ages 12-13) in the urban marginal setting, but adolescence can extend well into the twenties for children in upper-middle classes. The rural population targeted by Progresa is probably closer to the former than the latter.

In their comparative study of teenage childbearing in Latin America, (Flórez and Núñez 2003) report that while childbearing under age 15 is rare in most countries, bearing a child at ages 17, 18, or 19 is fairly common, particularly in rural areas. Their study was based on data from Demographic and Health Surveys, which were not available for Mexico. In the mid-1990s, poor women in Mexico had their first child at the average age of 19.7 years compared to 22.5 years for the non-poor (Levy 2006). Only 56 percent of poor women used some method of birth control, compared to 71 percent of non-poor women. Poor women had substantially higher fertility than non-poor women, with 5.1 compared to 2.5 children. These differences are even more pronounced for poor women in rural areas.

The prevalence of early childbearing has declined in Mexico, but still remains high in rural areas. Using national population survey data, Mexico's National Population Council (CONAPO-Mexico 2000) reports that 39.5 percent of Mexican women born between 1953 and 1957 had their first birth before age 20 compared to 31.7 percent of the 1968-1972 generation. While age-specific fertility rates for Mexican women aged 15-19 have declined in recent years, adolescent fertility still accounts for one of every six births in the country (González-Garza, Rojas-Martínez et al. 2005). In the Progresa sample, which consists of poor rural women, about a third of mothers in the baseline had their first birth at age 17 or younger. Figure 1 shows the distribution of all mothers in the baseline by the age when they had their first birth. The modal age is 18.

Figure 1.



Unlike mothers who had their first births at an early age in the United States, nearly all (over 95 percent) of the early childbearing mothers in the rural Mexican study population were married with their spouses present in the household. In the Mexican case, there is no difference between early and later childbearers in the proportion of mothers who are heads of household with absent spouses (both are 5 percent). In the U.S., early childbearing is associated with a number of background characteristics (poverty, for example), whereas the rural Mexican population in the Progresa survey are much more homogeneous, though nearly 40 percent of women in households that fell below the 1997 poverty line were early child bearers, compared to less than a third for the non-poor (Table 1).

Table 1 Mothers by age at first birth and poverty status in 1997 baseline

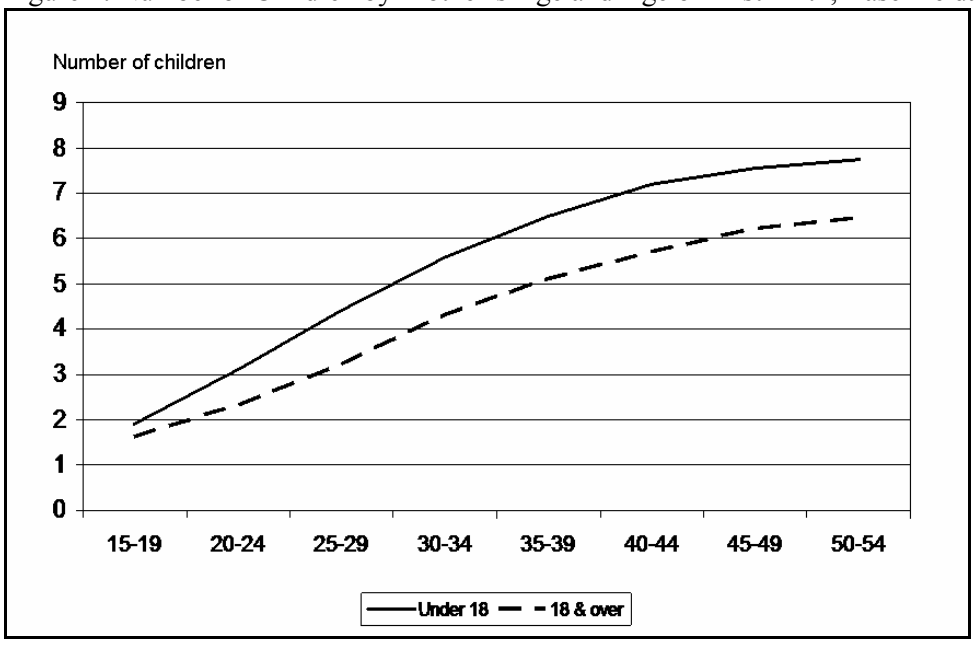
Age at First Birth	Poor	Non-Poor	Total
17 & Under	39%	33%	37%
18 & Over	61%	67%	63%
Total (n)	100 % (8338)	100 % (5212)	100 % (15,550)

Thirty-five percent of mothers who were early childbearers had no education, compared to 26 percent for later childbearers (Table 2). Only 20 percent had completed primary, compared to 30 percent for later childbearers. Early childbearers were more likely to be indigenous language speakers than women with first births at age 18 and over. Similar differences are observed for other background variables. For example, thirty nine percent of early-childbearing women in all childbearing ages spoke an indigenous language, compared to 32 percent for later childbearers. Women who had no children were even less likely (25 percent) to speak an indigenous language.

Table 2 Mothers by level of education and age at first birth

Age First Birth	None (%)	Incomplete Primary (%)	Completed Primary (%)	Total (n)
17 & Under	35	46	20	100 (8585)
18 & Over	26	44	30	100 (4965)
Total	29	45	26	100 (13,550)

Figure 2: Number of Children by Mother's Age and Age of First Birth, Baseline data.



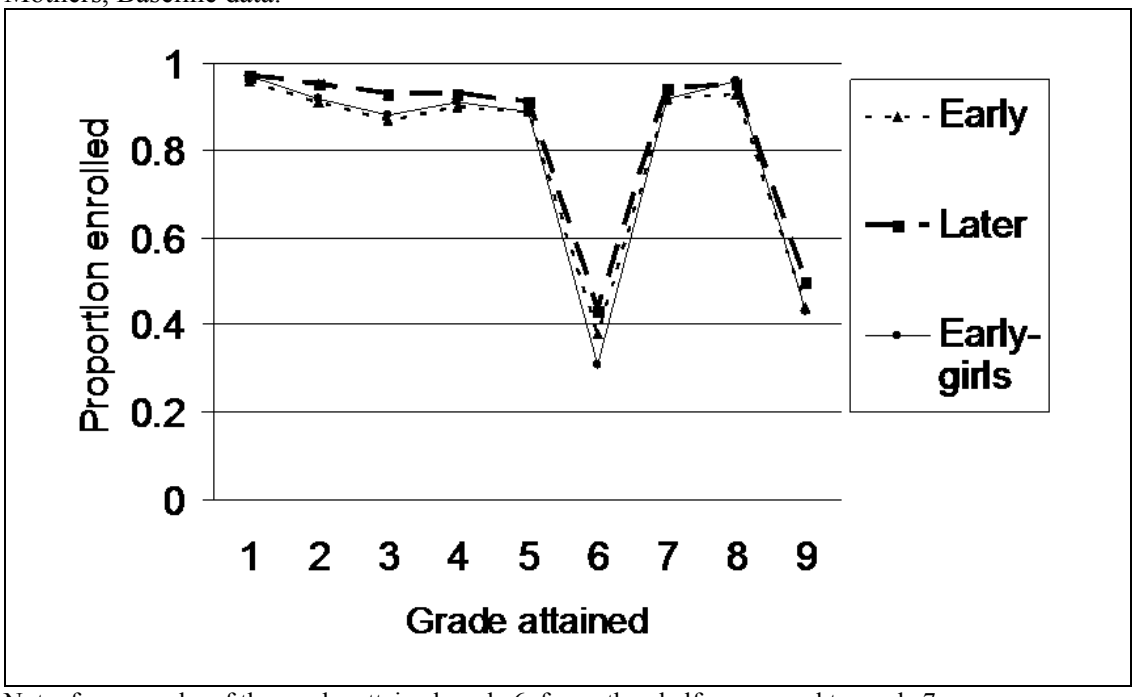
Early childbearers had more children than women who started childbearing later. By ages 50-54, mothers who had early first births had nearly 1.2 more children than those who started later (7.7 vs. 6.5, see Figure 2). The differential for women in their thirties was slightly higher: 1.3 children for women aged 30-34 and 1.4 children for women 35-39. By ages 50-54, only 9 percent of women in the survey population had no children, compared to 80 percent in the 15-19 age category. By their thirties, women without children accounted for only 10 percent of the survey population.

Mothers were less likely to work for pay than childless women, though participation in wage employment or working a family enterprise2 is low even for childless women (23 percent). Only 13 percent of mothers worked, with later childbearers reporting only marginally higher (less than a percentage point) work compared to women who had an early first birth.

School Enrollment of Children of Early vs. Late Childbearing Mothers

Children of early-childbearing mothers kept up with children of later childbearers during primary school, but did less well in progressing to secondary school (see Figure 3). Daughters were less successful than boys in progressing to secondary school. For those who did progress to secondary school, children of early and late childbearers did about as well in progressing to eighth and ninth grades.

Figure 3: Proportion of Children Enrolled by Grade Attained* for Early vs. Later Childbearing Mothers, Baseline data.



Note: for example, of those who attained grade 6, fewer than half progressed to grade 7.

Since most of the improvements that Progresa evaluation research observed in school enrollment occurred in the progression from primary to secondary school, we focus the analysis on secondary-school age children (ages 12-16). On average, children born to early-childbearing mothers will be older than children born to late childbearers, so mothers need to be old enough at the time of the survey for their children to have reached the secondary school ages. Children of older mothers, particularly early childbearing women, also will be older than school age. In order

to reduce possible distortions at both extremes of the maternal age distribution, we focus the analysis on children of mothers who were 30-39 years old at the time of the baseline survey in 1997.

What do the baseline data tell us about the relationship between early childbearing and secondary school enrollment? Overall secondary enrollment for secondary school age (12-16) children in the 1997 baseline survey was 59 percent (Table 3). There is an 11 percentage point difference (64 vs. 53 percent) between boys and girls, and a 7 percentage point difference (55 percent vs. 62 percent) between children of early and late childbearers. There is a 5 percentage point difference for sons and a 9 percentage point difference for daughters of early vs. late childbearing mothers.

Table 3 Percent enrolled in secondary school of high-school age (12-16) children whose mothers were age 30-39 in 1997, by age of mother's first birth and sex of children.

	First birth <18	First birth 18 & over	Both groups
All children	55	62	59
Boys	61	66	64
Girls	48	57	53

Further, when the tabulation is made for children in households classified as poor by Progresa, overall enrollment drops to 56 percent. The early versus late child bearing differential continues at 5 percentage points for boys and nine for girls, but the gender difference, which is 9 percentage points in the full study population, rises to 14 percentage points overall for poor families, so that only 44 percent of poor girls whose mother had an early first birth were enrolled in secondary school compared to an enrollment rate of 65 percent for poor boys whose mothers had their first births later.

Table 4 Percent enrolled in secondary school of POOR high-school age (12-16) children whose mothers were age 30-39 in 1997, by age of mother at first birth and sex of children.

	First birth <18	First birth 18 & over	Both groups
All children	53	59	56
Boys	61	65	63
Girls	44	53	49

Early childbearing/education links: Preliminary analysis of baseline

To what extent do these relationships persist when the data are analyzed with controls for age, grade level and other factors that the Progresa evaluation literature has identified as either "supply" or "demand" factors that influence secondary school enrollment levels? These controls include the age and grade level attained by children, the mothers' and fathers' educational attainment, local wage rates, distance from capital cities, and distance from secondary schools. Means and standard deviations of variables are presented in Annex Table 1. Dummy variables are employed for most variables and for cases where no wage or distance data were available. The theoretical underpinnings of the control variables are explained by Schultz (2004).

Table 5 shows probit regression results for all secondary school-age (12-16) children in the 1997 baseline data whose mothers were aged 30-39 in 1997. The dependent variable is a dummy variable that takes a value of one if the child is enrolled in secondary school. The "base" model includes the variables in Schultz's evaluation of the impact of Progresa on secondary enrollment. A second model adds a dummy variable equal to one if the mother had first birth at 17 or younger, and a third adds a variable to control for the number of children the mother reports. The

results in the table show marginal effects at the sample mean of each independent variable on the proportion enrolled.

Completion of primary school by mothers and fathers has a strong positive impact on their children's secondary enrollment. Girls have a lower likelihood of enrolling than boys. Controls for age and grade level reflect age and grade-specific enrollment rates. There is a sharp drop in enrollments from grade six to grade seven, but once children are enrolled in secondary school, they tend to stay enrolled through grade nine. As in earlier evaluations, distance to the capital city is associated with higher enrollment, the theory being that distance increases the costs of moving to a job. Distance to a secondary school has a negative (though only marginally significant) impact on enrollment, reflecting the time costs a family must take into account in deciding to enroll a child (see Schultz 2004). Male but not female wages (an opportunity cost of going to school) have a marginally negative impact.[2] When the regressions were done separately for boys and girls, male wage rates had a negative impact on enrollment of boys but not girls (see Annex Table 2). Also, mother's education has a strong positive impact for girls but not boys, while the reverse is true in the regressions for boys only, where father's education is significant.

Table 5: Probit Regression results, 1997 baseline data.

Dependent variable: school enrollment	Base		Add ECB		Add # of children	
Marginal effect at mean of:	df/dx	t *	df/dx	t *	df/dx	t *
Mom completed primary	0.0905	3.31	0.0854	3.11	0.0774	2.81
Dad completed primary	0.0957	3.49	0.0958	3.50	0.0888	3.24
Dummy = 1 if girl	-0.1071	-5.06	-0.1084	-5.12	-0.1077	-5.07
Dummy =1 if household is poor	-0.0393	-1.64	-0.0396	-1.65	-0.0259	-1.05
Dummy age12	0.4223	16.93	0.4211	16.86	0.4177	16.54
Dummy age13	0.3326	11.51	0.3328	11.53	0.3278	11.29
Dummy age14	0.2172	7.12	0.2163	7.08	0.2137	7.02
Dummy age15	0.0849	2.77	0.0864	2.82	0.0843	2.74
Dummy grade 6	-0.2607	-7.39	-0.2589	-7.34	-0.2483	-7.07
Dummy grade 7	0.3296	8.46	0.3305	8.52	0.3331	8.62
Dummy grade 8	0.3827	11.38	0.3837	11.43	0.3852	11.44
Distance to capital city (km)	0.0021	6.40	0.0021	6.49	0.0020	6.22
Distance, secondary school (m)	-0.0250	-2.28	-0.0241	-2.19	-0.0237	-2.14
Dummy no data on distance	0.0212	0.52	0.0237	0.58	0.0239	0.58
Dummy no female wage data	0.0217	0.29	0.0164	0.22	0.0145	0.19
Dummy no male wage data	-0.1525	-1.69	-0.1522	-1.68	-0.1503	-1.66
Local wage for females	0.0017	0.63	0.0015	0.57	0.0014	0.52
Local wage for males	-0.0027	-1.51	-0.0027	-1.52	-0.0027	-1.51
Dummy if mom's first birth <18			-0.0417	-1.90	-0.0290	-1.30
Number of children					-0.0161	-3.07
Pseudo R-square	.352		.352		.355	
Number of observations	3349		3349		3349	

*t ratios based on standard errors adjusted for locality clustering.

When we add to the regression a dummy variable for children whose mothers had a first birth before age 18, it has a negative impact as expected. However the coefficients for education decrease by about five percent from what they were in the baseline regression because of

[2] Locality clustering increases the standard errors for the adjusted wage estimates.

correlation between early childbearing and mother's schooling (see Annex Table 4). When the number of children reported is added in the third model, the early childbearing coefficient drops and is not significant, suggesting that much of the impact of early childbearing works through the number of children a mother has had.

How much did Progresa contribute to narrowing of the ECB gap for girls?

Tabulations on the November 2000 round of the panel show that the gender differentials were eliminated in families who received transfer payments but persisted in the control group. However, by November 2000, a number of families in the original control group had started receiving payments. The 2003 survey identified these households, which enables us to categorize such households as "later inclusion" in the analysis.

By November 2000, overall enrollment had risen by 7 percentage points (from 59 to 66 percent. Moreover the gender gap between boys' enrollment and girls' enrollment dropped from 11 percentage points to 2 percentage points (Table 6). While boys' enrollment increased by 3 percentage points, the rate for girls increased four times as much. The early vs. late childbearing difference for girls was also reduced, from 9 to 4 percentage points.

Table 6: Percent of high-school age (12-17) children who were enrolled in secondary school in 2000, by age of mother's first birth and sex of children for mothers aged 30-39 in 1997

	First birth <18	First birth 18 & over	Both groups
All children	63	68	66
Boys	63	69	67
Girls	63	67	65

When the study population is split into the original 'payment' and 'control' subgroups (payment means getting cash, control not getting), differences in enrollment by early vs. late child bearers narrow even more, particularly for girls (Table 7), while differences in the control group persist despite an overall increase in enrollment rates (Table 8). Poor girls with early childbearing mothers who had a 44 percent enrollment rate in the baseline had a 66 percent rate in the 2000 survey and had almost caught up to daughters of mothers who were later childbearers. When the sample was subdivided to take account of families who had moved from the control to payment category in 1999-2000, there was little change in the control group patterns shown in Table 8.

Table 7: Percent of high-school age (12-17) children who were enrolled in secondary school in 2000, by age of mother's age at first birth and sex of children for mothers aged 30-39 in 1997, Original Payment Group

	First birth <18	First birth 18 & over	Both groups
All children	66	69	68
Boys	65	69	68
Girls	66	68	68

Table 8: Percent of high-school age (12-17) children who were enrolled in secondary school in 2000, by age of mother at first birth and sex of children for mothers aged 30-45 in 1997, Original Control Group

	First birth <18	First birth 18 & over	Both groups
All children	60	68	65
Boys	61	70	66
Girls	59	66	64

Analysis of Changes

Table 9 reports regression analysis that decomposes changes in enrollment using controls for mother's and father's education, ages and grade levels of secondary school children, number of children, wages and distance data for localities, plus dummy variables for Progresa localities, poverty status, time and early childbearing. The probit regressions on which the estimates in Table 9 are based are reported in Annex Tables 3a and 3b.

As noted, by the time of the November 2000 survey a number of localities in the original control group were incorporated in the Progresa program. The 2003 survey identifies households in these localities, which permitted the construction of an alternative treatment baseline which includes the original baseline localities plus localities incorporated in 1999-2000. Regressions were run for both definitions of the baseline and are reported separately in Table 9.

The regression results reported in Table 3a show a marginal improvement in boys' enrollment of 2.65 percentage points and an improvement of 10.5 percentage points for girls. The coefficients reported in Table 9 suggest that Progresa increased the enrollment of girls whose mothers where early childbearers by between 3.6 and 4.6 percentage points over and above the general improvements that occurred between 1997 and 2000. The improvement calculated using with localities incorporated in 1999-2000 is one percentage point higher than for the original baseline, which would have been expected to understate the impact of the program by leaving out the effect of transfers to families who were not in the original baseline but had been incorporated in the program in 1999-2000. In the case of boys, there was a general improvement in enrollment levels between 1997 and 2000 but no impact on differentials between sons of early vs. late childbearing mothers. Chi-square tests of the significance of the net impact was significant at the p=.005-.007 level for girls but not for boys (p=.788-.914).

Table 9: Probit estimates of the effects of Progresa on enrollment of children in poor households whose mothers were early childbearers

	Original baseline		Including localities incorporated in 1999-2000	
	Boys	Girls	Boys	Girls
Early CB in Progresa locality	.02814	-.1470	-.01721	-.1229
(t-ratio)	(0.47)	(-2.21)	(-0.32)	(-2.07)
Poor early CB in Prog. locality	-.02210	.1825	-.00682	.1688
(t-ratio)	(-0.33)	(2.78)	(-0.13)	(3.13)
Net impact	-.00604	.0355	-.02403	.0459
Significance non-zero joint $\chi 2$	(0.678)	(.007)	(.914)	(.005)
Sample size	3649	3552	3649	3552
Pseudo R-square	.328	.390	.327	.391

Estimates from regressions reported in Annex Tables 3a and 3b.

Discussion:

Mexico's Progresa program sought to reduce the intergenerational transmission of poverty by increasing secondary-school enrollments through conditional cash transfers to households whose children went to school. Earlier evaluations of Progresa report that the program was successful in increasing enrollment in secondary school by 9.2 percentage points for girls and 6.2 percentage points for boys. This paper looks further into the relationship between poverty reduction, secondary school enrollment, and specific reproductive outcome to ask (1) whether children of

mothers who were early (age 17 and younger when they had their first birth) childbearers did less well in progressing from primary to secondary school than children of mother who initiated childbearing later (at ages 18 and older) and (2) whether the cash transfer program helped those children of early childbearers make up the deficit.

Answering these questions raised a number of methodological concerns, beginning with the decision of what age cutoff to use for classifying mothers as early childbearers. The median age of first birth of mothers in the Progresa sample of rural households was 18, which is somewhat older than what would be considered "early" in Asia but is low by comparison with urban Mexico and other Latin American countries. Mothers who had their first birth at age 17 or younger were considered "early" childbearers for this analysis.

The study population is children who were in the secondary school ages (ages 12-16). Observations for each child in the study population were matched to data on their mothers, so that each observation includes characteristics of the child, his or her mother, and the household. An issue that arises is that children of mothers of early childbearers will be older on average than children of later childbearers, so that comparisons of children might be distorted by differences in their age composition. For later childbearing women, none of their children would have reached secondary school age until mothers were aged 30 or more. For early childbearing women over 40, most of their children would have aged out of the secondary school ages. For this reason, the study focuses on children whose mothers were aged 30-39.

Another problem that arose in the linking of children with their mothers is the lack of information on relationships within families in the Progresa data. This limited the extent to which children can be linked to their mothers. Several "relation to head" categories are ambiguous with respect to which person might be the mother of the individual. For example, a number of children are listed as being nieces, nephews, cousins, etc. of the household head or spouse of the household head. In order to be sure that children were correctly matched, only children listed as being sons or daughters of the head of a household in which the mother was present are included. This reduced the number of children in the sample population compared to samples used in the Progresa evaluations that are cited above.

Another issue is that childbearing variables (age at first birth and the number of children) are correlated with other variables being used to analyze enrollment probabilities, particularly education of parents, and that other, unobserved factors may be causing childbearing behaviors. This echoes the concerns about the establishing causality for the impacts of early childbearing in the U.S.—whether the effects of early childbearing result from the mother's age or from unobserved background variables (poverty, low education, language) which affected both.

At the same time, we note that Schultz (2004) found no evidence that Progresa payments affected fertility decisions in the study population. Further, the first births that are reported in the baseline data occurred before the start of the Progresa program, so it would be reasonable to argue that observed levels of early childbearing and the number of births were <u>not</u> affected by the cash transfer payments. Thus while the data do not permit drawing conclusions about the causes of early childbearing, it appears reasonable to employ these variables as controls in assessing whether Progresa payments helped to make up enrollment deficits of early vs. later childbearers.

Tabulations of the 1997-1998 baseline data revealed that such deficits were present prior to the initiation of Progresa. There was 5 percentage point difference for sons and a 9 percentage point difference for daughters of early vs. late childbearing mothers. For children in poor households eligible for Progresa differences are even more marked; only 44 percent of daughters of early

childbearers who had completed primary school were enrolled at secondary level, compared to 65 percent of boys whose mothers were later childbearers.

Tabulations of the November 2000 round of the Progresa showed a 7 percentage point increase in overall enrollment rates (from 59 to 66 percent) , and a marked reduction in the difference between rates for boys and rates for girls. Using regression analysis to control for variables affecting enrollment ratios, we conclude that Progresa also reduced the initial enrollment deficit for daughters whose mothers were early childbearers by between 3.6 and 4.6 percentage points depending upon whether comparisons are for the original payment vs. control group or the revised payment group that includes localities incorporated in Progresa in 1999-2000.

These findings underscore the importance of effectively targeting interventions to such disadvantaged groups as the daughters of poor mothers who start having children at an early age. Given the strong linkage between secondary school enrollment and later childbearing, transfers that benefit the daughters of early childbearers appear to be an exceptionally effective way to reduce the intergenerational transmission of poverty through early childbearing. Since the survey covers only the poor rural communities selected for the first stage of the Progresa program, it is not representative of the population of Mexico or even rural Mexico. As Progresa (and Oportunidades) expanded to more rural communities and later to urban areas, its impact on educational outcomes continued to be strong, and one would expect that it also helped to overcome the educational disadvantage that poor daughters of early childbearers experienced. A later survey conducted in 2003 has a reproductive health module, and the next stage of the analysis will focus on the 2003 data. Unfortunately, the incorporation of localities into the payment group effectively eliminated the original control group. Mexico initiated another panel survey program, the Mexican Family Life Survey, in 2002 (Universidad Iberoamericana and CIDE 2006). It is a smaller sample, but is nationally representative. It includes household demographic questions and may enable further analysis of early childbearing issues.

Turning finally to the question posed at the beginning of the paper about how well a dataset designed for the specific purpose of evaluating the impact of cash transfers under Progresa can help us assess the impact of the program in addressing enrollment deficits related to early childbearing, it is safe to say that it was possible to get a satisfactory answer to that specific question but that features of the design limit the extent to which the data can be employed to answer a broader range of questions about the links between reproductive outcomes, poverty, and intergenerational transmission of poverty though education and other dimensions of human development at the household level. The fact that the household roster in the Progresa survey data limited our ability to map intra-household relationships meant that the analysis had to be restricted to own children of mothers who were spouses of the household head. Information (for example, enrollment of children who were excluded from the analysis) that was used in the more general analysis of the impact of Progresa was lost in this process.

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Annex Table 1: Means and standard deviations* of variables

	All Children	Boys	Girls
Dummy: attending school	0.586	0.638	0.531
Dummy: mom's first birth<18	0.445	0.458	0.432
Dummy: mom completed primary	0.236	0.223	0.250
Dummy: dad completed primary	0.276	0.277	0.276
Dummy: household qualifies as poor	0.678	0.674	0.682
Dummy: age12	0.153	0.155	0.150
Dummy: age13	0.218	0.210	0.226
Dummy age13	0.222	0.213	0.231
Dummy: age15	0.229	0.230	0.228
Dummy: age16	0.178	0.191	0.165
Dummy: grade 6	0.534	0.501	0.569
Dummy: grade 7	0.175	0.191	0.159
Dummy: grade 8	0.146	0.150	0.142
Dummy: grade 9	0.144	0.158	0.130
Local wages for males	27.794 0.168	27.532 0.235	28.067 0.240
Local wages for females	11.153 (.231)	11.420 (.324)	10.875 (.331)
Dummy: not male wage data	0.027	0.029	0.024
Dummy: no female wage data	0.547	0.534	0.560
Distrance to school (km)	1.957 (.030)	1.956 (.042)	1.958 (.042)
Dummy: no distance data	0.292	0.290	0.295
Distance to nearest state capital (km)	113.357 (.669)	114.695 (.919)	111.968 (.972)

*Standard deviations for 0-1 dummy variables equal the square root of (mean(1-mean))

Annex Table 2: 1997 regressions run separately for boys and girls

	Boys		Girls	
	dfdx	t	dfdx	t
Mom completed primary	0.0496	1.41	0.1084	2.90
Dad completed primary	0.1302	3.86	0.0314	0.80
Dummy =1 if household is poor	0.0121	0.40	-0.0696	-1.76
Dummy age12	0.3743	12.02	0.4562	10.51
Dummy age13	0.3036	8.25	0.3437	7.18
Dummy age14	0.1875	4.58	0.2314	4.94
Dummy age15	0.1021	2.87	0.0581	1.13
Dummy grade 6	-0.2058	-4.84	-0.3023	-5.89
Dummy grade 7	0.2777	6.15	0.3927	8.86
Dummy grade 8	0.3174	8.51	0.4568	8.79
Distance to capital city (km)	0.0018	4.63	0.0024	5.09
Distance, secondary school (m)	-0.0293	-2.34	-0.0132	-0.85
Dummy no data on distance	-0.0173	-0.34	0.0746	1.38
Dummy no female wage data	0.0369	0.39	-0.0115	-0.12
Dummy no male wage data	-0.2184	-2.29	-0.0487	-0.36
Local wage for females	0.0020	0.56	0.0007	0.21
Local wage for males	-0.0048	-2.53	0.0001	0.02
Dummy if mom's first birth <18	-0.0134	-0.46	-0.0472	-1.54
Number of children	-0.0155	-2.34	-0.0155	-1.94
Pseudo r-square	.326		.387	
N	1706		1643	

t ratios based on SEs adjusted for location clustering.

Annex Table 3a: Probit regression results for combined 1997 and 2000 samples of secondary school age children (12-16) whose mothers were 30-39 in 1997, original baseline

Dependent variable: enrollment	Boys		Girls	
Marginal effect at mean of:	df/dx	t*	df/dx	t*
Mom completed primary	0.0530	2.07	0.0734	2.92
Dad completed primary	0.1183	4.49	0.0616	2.12
Dummy age12	0.3444	17.11	0.4109	17.45
Dummy age13	0.3104	13.53	0.3338	12.07
Dummy age14	0.1905	7.59	0.2028	7.33
Dummy age15	0.0737	3.10	0.0323	1.04
Dummy grade 6	-0.2009	-6.03	-0.2633	-7.03
Dummy grade 7	0.3175	6.22	0.3315	4.65
Dummy grade 8	0.3096	10.22	0.3790	9.07
Dummy base x grade 6	0.0247	0.55	0.0771	1.68
Dummy base x grades 7 & 8	-0.0495	-0.75	0.0602	0.79
Distance to capital city (km)	0.0017	5.59	0.0016	4.89
Distance, secondary school (m)	-0.0203	-1.91	-0.0316	-2.76
Dummy no data on distance	-0.0121	-0.30	0.0138	0.33
Dummy no female wage data	0.0373	0.62	0.0341	0.52
Dummy no male wage data	-0.1124	-1.39	-0.2149	-2.04
Local wage for females	0.0011	0.54	0.0013	0.58
Local wage for males	-0.0020	-1.43	-0.0013	-0.77
Dummy if mom's first birth <18	-0.0266	-1.16	-0.0316	-1.27
Number of children	-0.0146	-3.46	-0.0075	-1.25
Dummy t=2000	0.0265	1.26	0.1053	4.24
Dummy if pobre	0.0346	1.09	-0.0210	-0.57
Dummy if in baseline treatment locality	0.0328	0.88	0.0426	1.01
Interaction: base * pobre	-0.0560	-1.00	-0.0893	-1.55
Interaction: base x Early CB x t=2000	0.0281	-0.47	-0.1470	-2.21
Interaction: pobre x base x Early CB x t=2000	-0.0221	-0.33	0.1825	2.78
Pseudo R-Square	.328		.390	
N	3649		3552	

Note: ratios based on robust standard errors adjusted for location clustering.

Annex Table3b: Probit regression results for combined 1997 and 2000 samples of secondary school age children (12-16) whose mothers were 30-39 in 1997, payment group now includes localities added in 1999-2000

Dependent variable: enrollment	Boys		Girls	
Marginal effect at mean of:	df/dx	t*	df/dx	t*
Mom completed primary	0.0539	2.10	0.0750	3.01
Dad completed primary	0.1185	4.54	0.0618	2.10
Dummy age12	0.3448	16.98	0.4110	17.56
Dummy age13	0.3101	13.45	0.3344	12.08
Dummy age14	0.1903	7.57	0.2016	7.28
Dummy age15	0.0730	3.08	0.0330	1.07
Dummy grade 6	-0.2172	-5.83	-0.2620	-6.48
Dummy grade 7	0.3107	6.02	0.3767	5.52
Dummy grade 8	0.3090	8.75	0.3985	8.43
Dummy base x grade 6	0.0482	1.10	0.0513	1.16
Dummy base x grades 7 & 8	-0.0320	-0.49	-0.0374	-0.46
Distance to capital city (km)	0.0017	5.57	0.0017	4.94
Distance, secondary school (m)	-0.0204	-1.92	-0.0328	-2.86
Dummy no data on distance	-0.0137	-0.34	0.0119	0.28
Dummy no female wage data	0.0377	0.61	0.0400	0.60
Dummy no male wage data	-0.1113	-1.38	-0.2174	-2.04
Local wage for females	0.0011	0.53	0.0015	0.63
Local wage for males	-0.0019	-1.41	-0.0013	-0.77
Dummy if mom's first birth <18	-0.0105	-0.37	-0.0371	-1.31
Number of children	-0.0146	-3.42	-0.0074	-1.22
Dummy t=2000	0.0397	1.54	0.0851	2.98
Dummy if pobre	0.0239	0.56	-0.0462	-0.86
Dummy if in alt-baseline treatment locality	0.0099	0.23	0.0533	0.99
Interaction alt-base * pobre	-0.0438	-0.77	-0.0374	-0.54
Interaction alt-base x Early CB x t=2000	-0.0172	-0.32	-0.1229	-2.07
Interaction pobre x alt-base x Early CB x t=2000	-0.0068	-0.13	0.1688	3.13
Pseudo R-Square	.327		.391	
N	3649		3552	

Note: ratios based on robust standard errors adjusted for location clustering.

Annex Table 4: Correlations between Maternal Age, Maternal Education, Number of Children, Age at First Birth, and Household Poverty.

	momage97	momgrade	age1st~h	numbrths	pobre
momage97	1.0000				
momgrade	-0.4184	1.0000			
age1stbrth	0.1315	0.0906	1.0000		
numbrths	0.5212	-0.3218	-0.2270	1.0000	
pobre	-0.2322	-0.1020	-0.0771	0.0380	1.0000

References:

Behrman, J. R., P. Sengupta, et al. (2005). "Progressing though PROGRESA: an Impact Assessment of a School Subsidy in Rural Mexico." Economic Development and Cultural Change **54**: 237-275.

Buvinic, M. (1998). "The costs of adolescent childbearing: evidence from Chile, Barbados, Guatemala, and Mexico." Studies in Family Planning **29**(2): 201-209.

CONAPO-Mexico (2000). Inicio de la vida reproductiva. Cuadernos de salud reproductiva, República Mexicana. Mexico City, Consejo Nacional de Población**:** 21-33.

Flórez, C. E. and J. Núñez (2003). Teenage Childbearing in Latin American Countries. Critical Decisions at a Critical Age: Adolescents and Young Adults in Latin America. S. Duryea, A. C. Edwards and M. Ureta. Washington, DC, Inter-American Development Bank**:** 23-90.

González-Garza, C., R. Rojas-Martínez, et al. (2005). "Perfil del comportamiento sexual en adolescentes mexicanos de 12 a19 años. Resultados de la ENSA 2000." Salud Pública de México **47**(3): 209-218.

Greene, M. E. and T. Merrick (2005). Poverty Reduction: Does Reproductive Health Matter? HNP Discussion Paper. Washington, DC, World Bank.

Haveman, R., B. Wolfe, et al. (1997). Children of early childbearers as young adults. Children Having Children: Economic Costs and Social Consequences of Teen Pregnancy. R. A. Maynard. Washington, DC, The Urban Institute Press**:** 257-281.

Hoffman, S. D. (1998). "Teenage childbearing is not so bad after all. Or is it? A review of the new literature." Family Planning Perspectives **30**(5): 236-243.

INSP México, I. N. d. S. P. (2005). General Rural Methodology Note. México, Coordinación Nacional de Programa de Desarrollo Humano Oportunidades, SEDESOL.

Levine, J. A., H. Pollack, et al. (2001). "Academic and Behavioral Outcomes Among the Children of Young Mothers." Journal of Marriage and Family **63**: 355-369.

Levy, S. (2006). Progress Against Poverty: Sustaining Mexico's Progresa-Oportunidades Program. Washington, DC, Brookings Institution Press.

Mathur, S., G. M., et al. (2003). Too Young to Wed: The Lives, Rights and Health of Young Married Girls. Washington, DC, International Center for Research on Women.

Maynard, R. A. (1997). The costs of adolescent childbearing. Children Having Children: Economic Costs and Social Consequences of Teen Pregnancy. R. A. Maynard. Washington, DC, Urban Institute Press**:** 285-335.

Parker, S. W., J. Behrman, et al. (2005). Impacto de Mediano Plazo del Programa Oportunidades sobre la Educación y el Trabajo de Jóvenes del Medio Rural que Tenían de 9 a 15 Años de Edad en 1997. Evaluación Externa de Impacto del Programa Oportunidades 2004: Educación. B. H. Prado and M. H. Avila. Cuernavaca, México, Instituto Nacional de Salud Pública. **1**.

Parker, S. W. and G. M. Teruel (2005). "Randomization and Social Program Evaluation: The Case of Progresa." The Annals of the American Academy of Political and Social Science **599**(1): 199-219.

Schultz, T. P. (2004). "School subsidies for the poor: evaluating the Mexican Progresa poverty program." Journal of Development Economics **74**: 199-250.

Skoufias, E. (2005). PROGRESA and Its Impact on the Welfare of Rural Households in Mexico. Research Report #139. Washington, DC, International Food Policy Research Institute.

Skoufias, E. and S. W. Parker (2000). "Conditional Cash Transfers and Their Impact on Child Work and Schooling: Evidence from the PROGRESA Program in Mexico." Economia **2**(1): 45-96.

Stern, C. (2002). Poverty, social vulnerability and adolescent pregnancy in Mexico: a qualitative analysis. Reproductive Health, Unmet Needs, and Poverty: Issues of Access and Quality of Services. Bangkok, Thailand, CICRED.

Universidad Iberoamericana and CIDE (2006). The Mexican Family Life Survey. Mexico City. **2007**.

Zabin, L. S. and K. Kiragu (1998). "The health consequences of adolescent sexual and fertility behavior in Sub-Saharan Africa." Studies in Family Planning **29**(2): 210-232.