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The Effects of Early Pregnancy on Education, Physical Health and Mental Distress: Evidence from Mexico

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Abstract

This paper estimates the effects of early pregnancy on education, labor force participation, physical and mental health, and preventive health behaviors of young girls in Mexico. In order to overcome the selection bias, this paper employs a propensity score matching analysis using a nationally representative longitudinal data from the Mexican Family Life Survey. In the short run, early pregnancy increases the probability of being overweight and anemic, and reduces physical activity; however, it does not affect mental health. The results also demonstrate that early pregnancy increases the probability of dropping out of high school and reduces labor force participation. Finally, the effect on being overweight operate through reduced education and physical activity, and moreover, the effect persists in the long run.

JEL classification: I1, J13
Keywords: Early Pregnancy, Human Capital, Mexico

1. Introduction

Early childbearing is of great policy concern, especially in developing countries where high adolescent fertility rates persist.[1] Because early childbearing is commonly associated with adverse socioeconomic outcomes for both mothers and their children, policy makers have emphasized that reducing adolescent pregnancy and childbearing is one key strategy to address the intergenerational transmission of poverty. However, early pregnancy might be a marker of disadvantage, rather than a cause of adverse outcomes. In order to design an effective poverty reduction policy, it is important to understand whether early pregnancy is a cause of poor outcomes or a consequence of socioeconomic disadvantages. Moreover, while most research has focused on studying the education and labor market consequences of early pregnancy, less is known about health consequences. This paper uses data from Mexico to estimate the effects of early pregnancy on the education and health of young girls.

Estimating the impact of early childbearing and pregnancy is challenging because fertility decisions are not random. Unobserved heterogeneity between early and later child-bearers might bias the results as young mothers might be a select group that would experience adverse outcomes even in the absence of a child. To address the problem of selection bias, recent rigorous studies, predominately in the United States, have used several approaches, including within-family estimations using data on pairs of sisters and twins (Geronimus & Korenman 1992; Holmlund 2005; Webbink et al. 2011; Gunes 2016), instrumental variables (IV) using twin births and miscarriage as instruments (Klepinger et al. 1999; Bronars & Grogger 1994; Hotz et al. 2005; Fletcher 2012), and propensity score matching (Chevalier & Viitanen 2003; Levine & Painter 2003). While the results generally suggest a negative relationship between early

[1] Africa has the highest adolescent fertility rates in the world, followed by Latin America and the Caribbean (United Nations, 2013).

childbearing and socioeconomic outcomes, adverse consequences of early childbearing in the United States are believed to be overstated (for a survey of literature, see Kearney and Levine, 2012).

There is a lack of rigorous empirical evidence on the adverse consequences of early pregnancy and childbearing in the context of developing countries. A couple of exceptions are studies by Ranchhod et al. (2011) and Ardington et al. (2015) which use data from South Africa and show that teenage childbearing reduces education, even after accounting for pre-fertility characteristics using a propensity score matching approach.[2]

While most rigorous research so far in both developed and developing countries has focused on studying education and labor market outcomes, the evidence on how health and health behaviors of young mothers are affected is scarce. In the United States, Gunes (2016) finds no effect of teenage childbearing on health outcomes and modest effects on preventive health behaviors, while Fletcher (2012) finds no effects on risky health behaviors. In South Africa, Ardington et al. (2015) find that teenage childbearing is associated with a higher mortality risk before the age of 30, largely due to AIDS-related deaths.

This paper adds to the few rigorous studies exploring the consequences of early childbearing and pregnancy in the context of developing countries. In particular, this paper estimates the effects of early pregnancy on the education and health of young girls, using three waves of the rich nationally representative longitudinal Mexican Family Life Survey conducted in 2002, 2005-2006, and 2009-2012. More specifically, we explore the effects on school dropout and cognitive test scores, labor force participation, several physical health outcomes, including self-reported health, anemia, and being overweight, mental health, and physical activity. In order

[2] Ardington et al. (2015) find consistent results using OLS and sibling fixed effects approaches, implying that there is little selection bias in the South African context.

to overcome the possible selection bias, this paper employs a propensity score matching approach. As a robustness test, we employ an individual fixed-effects model that could account for omitted variable bias. Furthermore, this paper explores several mechanisms through which early pregnancy affects health and education, including employment, marital status, physical exercise, and health insurance. Finally, this paper examines the long-run health and labor market implications of early pregnancy employing a biprobit regression analysis with age at menarche as an instrument for early pregnancy using a sample of older women.

We find that early pregnancy significantly increases the probability of being overweight and anemic and reduces physical activity in the short run. Furthermore, short-run analysis suggests that early pregnancy increases the probability of dropping out of school before completing high school and reduces the probability of labor force participation. Finally, this paper demonstrates that the effect on being overweight operate through reduced education and physical activity, and moreover, the effect persists in the long run.

In many countries in Latin America and the Caribbean, including in Mexico, early childbearing remains high despite substantial declines in overall fertility rates (Figure 1). While high levels of early childbearing contribute to high levels of total fertility in most developing countries such as in the majority of sub-Saharan African countries, there is not a strong link between the two rates in Mexico. In Mexico, the demographic transition has been mostly driven by the declines in fertility among older women. This paper therefore explores the effects of early pregnancy in a context of high adolescent fertility rates where policies that reduced overall fertility have not been successful in reducing adolescent fertility. This is especially important to study since the intergenerational transmission of early pregnancy in Mexico is high—about two-thirds of adolescent mothers are born to adolescent mothers (Buvinic 1998).

The remainder of this paper is organized as follows: Section 2 describes the data and sample construction, Section 3 presents the empirical methodology, Section 4 discusses the results, Section 5 tests potential mechanisms, Section 6 explores the long-run implications of the findings, and Section 7 concludes.

2. Data

The data used in this paper are from the Mexican Family Life Survey (MxFLS), which follows 35,000 individuals from 8,400 households in 150 communities throughout the country.[3] The MxFLS is the first nationally representative longitudinal survey in Mexico. The first wave was conducted in 2002 (MxFLS-1), and the second (MxFLS-2) and third (MxFLS-3) waves were conducted during 2005-2006 and 2009-2012, respectively.

2.1 Education and Health Outcomes

We examine two main education outcomes: dropping out of school before completing high school and cognitive test scores. Previous work in developing countries has shown that early pregnancy has a negative impact on educational attainment in South Africa (Ardington et al. 2015). We provide evidence for Mexico, and moreover, we extend the analysis to the study of skill accumulation. To examine the effects on cognitive skills, we use test scores from Raven's Colored Progressive Matrices Assessment administered during the survey. Raven's test is believed to provide a general measure of cognition, which is also affected by education.[4] While the number of years of schooling provides a measure of quantity of education, cognitive skills provide a measure of both quantity and quality of education. Moreover, cognitive skills have an independent effect on labor market outcomes beyond the effect of years of schooling (Glewwe

[3] http://www.ennvih-mxfls.org/.

[4] Recent research explores the effect of various educational interventions and migration on cognitive scores as measured by Raven's scores in developing countries, including Romania, Malawi, Nicaragua, and Mexico (Malamud and Pop-Eleches (2011), Baird et al. (2011), Barham et al. (2013), Powers (2010)).

2002; Hanushek & Woessmann 2008). It is thus important to consider cognitive skills in examining the potential losses associated with early pregnancy. Human capital can also be accumulated through work. Therefore, we examine employment status as a measure of human capital accumulation in addition to using it as a labor market outcome.

For health outcomes, we group the outcome variables into three categories: "physical health," "mental health," and "health behaviors." Physical health outcomes explored include anemia and being overweight. The binary indicator for being overweight (BMI of 25 or higher) is calculated using height and weight measured by trained health workers during the survey. Teenage pregnancy has been associated with increased risk of being overweight or obese later on in life (Chang et al. 2013). It is important to know whether young mothers are more likely to have a higher BMI both in the short and long run because obesity is associated with higher incidence of other diseases such as type 2 diabetes, high blood pressure and coronary heart disease and is responsible for 6-11% of deaths caused by major non-communicable diseases (Lee et al. 2012).

While being overweight may be a side effect of early pregnancy, another negative health consequence may be the increased risk of anemia. Anemia may be associated with fatigue and other health complications for the mother. It may also have an adverse effect on the infant as anemic mothers are more likely to have pre-term, low-weight babies, as well as iron deficiency which may have long-run consequences for the infant's physical and mental health (Viteri 1994). The MxFLS data provides information on hemoglobin levels in blood samples taken during the survey and thus allows studying the incidence of anemia (hemoglobin of less than 12grams per 100ml).

In addition to physical health outcomes, we also examine mental health outcomes which provide additional information on a person's well-being. Mental health is of interest because poor mental health may affect socioeconomic outcomes and thus short-run shocks to mental health may have long-term consequences (Haushofer & Fehr 2014; Lybbert & Wydick 2015; Cornaglia et al. 2015), and moreover, poor mental health negatively affects birth weight of the infants, which have adverse long-term consequences (Conway & Kennedy 2004). Mental health outcomes explored in this study are survey-based and measured based on a 20-question assessment of depressive symptoms developed by Calderon (1997) for the Mexican population. The assessment includes questions such as "In the last 4 weeks, have you felt sad or depressed?" and "In the last 4 weeks, have you lost interest in things?" Respondents can answer each question by "No," "Yes, sometimes," "Yes, lots of times," and "Yes, all the time" and each question is given a score between 1 (for no symptoms) and 4 (for symptoms present all the time). Thus, the overall assessment values range from 20 to 80 with higher values signifying greater mental health impairment. Clinical experience has shown that scores in the range of 20 through 35 are normal, scores between 36 and 45 indicate some anxiety, scores between 46 and 65 indicate a moderate level of depression and anxiety, and scores between 66 and 80 indicate severe depressive symptoms (Calderon 1997). Using this assessment, we measure mental health both as a continuous variable and a dummy variable indicating whether the scores are in the normal range.

Finally, we also examine the effects on self-reported health status (an overall measure of health and well-being), which has been shown to be a strong determinant of mortality and morbidity (see Idler and Benyamini (1997) for a survey of the literature). The outcome is a

dummy variable equal to 1 if the respondent reports very good or good health, and 0 otherwise (regular, bad, or very bad health).

The health behaviors explored include insurance status and physical activity. Physical activity is measured as a dummy variable indicating whether or not the respondent routinely exercises during the weekdays, as well as the number of days the respondent exercises in a given week. Forty-one percent of 15-18 years old in Mexico did not meet the physical activity recommendation of 60 minutes of moderate-to-vigorous physical activity per day in 2012, and sports practice was not a common type of physical activity in women of childbearing age in 1999 (Martinez et al. 2014; Hernández et al. 2003; Lee et al. 2012). Physical inactivity could be associated with obesity as well as poor mental health outcomes.

2.2 Sample of Analysis and Early Childbearing

This paper uses all three waves of the MxFLS survey. Since pregnancy information is only reported for women ages 14-49 and various outcomes are reported for people 15 and older, the earliest age at which we could examine the effect of early pregnancy is 15. We create two different samples which are pooled for the final analysis. The first sample includes girls at the ages of 15-18 at baseline in 2002, who have had no previous pregnancy at baseline and complete a follow-up survey in 2005. We thus explore the short-run effect of a pregnancy between the two survey waves on education and health outcomes in 2005. Similarly, the second sample includes girls at the ages of 15-18 in 2005, who have had no pregnancy prior to 2005 and are not already studied as part of the first sample. For this sample, we explore the short-run effects of early pregnancy on outcomes at the time of the third survey wave (2009 to 2012).[5] This yields 929 girls in the first sample and 930 girls in the second sample for a total of 1,859 girls with non-missing baseline information. Twenty-eight percent (521) of the girls in the full sample have an

[5] Since the follow-up was done over several years, all regressions control for year of survey fixed effects.

early pregnancy, where 24% of the girls in the first sample become pregnant between 2002 and 2005, and 32% of the girls in the second sample become pregnant between 2005 and 2009-2012.[6]

Table 1 compares the baseline characteristics of the girls that did not become pregnant in the time period and those that did become pregnant. The average age in both groups is about 16 years, although girls that had an early pregnancy are slightly older (16.34 vs. 16.20). A lower proportion of girls that subsequently had an early pregnancy were in school prior to pregnancy (0.48 vs. 0.69) and a higher proportion were working (0.18 vs. 0.11). Girls who had an early pregnancy were less likely to be single and more likely to ever have had sex. A significantly lower proportion of the girls that became pregnant lived in large metropolitan areas compared to girls that did not become pregnant, and their households appear to be poorer (based on the availability of several household assets).

2.3 Attrition and non-response

There are 2,389 girls who meet the age restriction at baseline and have had no prior pregnancy ("target sample"). The sample of analysis includes 1,859 girls (78% of the target sample) since there is attrition between the survey waves or non-response to the pregnancy questionnaire at the follow-up survey. About 13% of the target sample (303 girls) are lost to the follow-up surveys (MxFLS-2 for the first sample and MxFLS-3 for the second sample), and 227 girls (10% of the target sample) do not complete the pregnancy module at the follow-up survey. Thus, we exclude them from the analysis. We compare the characteristics of the girls excluded from the analysis to the girls in the sample of analysis (Appendix Table 1).

[6] The higher percentage of pregnancies in the second sample is partly due to the longer time period being studied. Dropping girls that were surveyed after 2009 yields a 29% pregnancy rate in the second sample.

Girls that are lost to the follow-up surveys are more likely to live in a city, live away from their parents, and work compared to girls in the sample of analysis. On the other hand, girls that do not complete the pregnancy module are in general similar to the girls in the sample of analysis. Therefore, the results of the analysis are subject to the caveat that there is attrition, which might limit the generalizability of the results.

3. Methodology

If early pregnancy was random, then an OLS model comparing the average outcomes of girls who had an early pregnancy and those who did not would yield unbiased estimates of the treatment effect. However, early pregnancy is likely not random and girls that did not have an early pregnancy may not provide the appropriate counterfactual for what would have happened had the young mothers not become pregnant. For example, if girls who had an early pregnancy were more likely to drop out of school or have unhealthy lifestyles even without getting pregnant, then the effect of pregnancy would be overestimated. Alternatively, if only girls who were in a good physical or mental health state were willing to get pregnant, then any negative effects of early pregnancy may be underestimated. Prior education and health outcomes or other personal and household characteristics may thus be important confounders. In order to deal with this possible selection bias, we employ an inverse propensity score weighting (IPW) approach. The main assumption of this approach is that conditional on observable characteristics, early pregnancy is random.

To estimate the probability of early pregnancy (EP), we use a logit model:

$$EP_{i,t+1} = \alpha_0 + X_{i,t}\gamma_1 + \epsilon_{i,t+1} \quad (1),$$

where $X_{i,t}$ are the baseline characteristics included in Table 1, as well as survey year and state fixed effects.[7] The estimated propensity scores range from 0.07 to 0.90 for girls that had an early pregnancy, and from 0.06 to 0.82 for girls that did not (Figure 2), indicating a good predictive power of the model.[8] We restrict the sample to observations with common support by dropping 14 observations, which results in a final sample of 1,845 girls.[9]

In the standard IPW approach, the propensity scores estimated from equation (1) are used to calculate weights which are included in the estimation of the effects of early childbearing on the outcomes of interest. If $p(X_{i,t})$ is the propensity score, then the weight is $1/p(X_{i,t})$ for girls that had an early pregnancy and $1/(1-p(X_{i,t}))$ for those that did not. The use of the weights equalizes the distribution of the confounders in the two groups and thus eliminates the correlation between any confounding factors and pregnancy. The average treatment effect using an IPW approach would then be estimated as the difference in the weighted average outcome of each group.

The main assumption of the propensity score approach is that selection into early pregnancy is based on observable characteristics (or that unobservable confounders have the same distribution as observable characteristics). In order to test this assumption and check whether weighting by the inverse propensity score creates an appropriate counterfactual group, we examine whether the means of the observable characteristics are balanced after weighting by the inverse propensity scores. Results in Table 2 suggest that there is no significant difference in the means of the baseline characteristics between girls that had an early pregnancy and those that

[7] Age is measured as dummies indicating age at 15, 16, 17 and 18.
[8] Results are available upon request.
[9] We then estimate a separate regression for each outcome measured at the follow-up surveys with non-missing information.

did not once the means are weighted using the inverse propensity scores, except for ever having had sex (significant at the 10% level).[10]

While the model meets the basic balancing checks, if the propensity score model is misspecified then the IPW estimator may still be biased. Therefore, in addition to the IPW model, we also estimate the treatment effect using a weighted regression model with covariate adjustment using a polynomial of the propensity score, as in Branson et al. (2015). This double robust estimation can be represented as follows:

$$Y_{i,t+1} = \alpha_1 + \delta EP_{i,t+1} + Z_{i,t+1}\beta_o + \beta_1 p(X_{i,t}) + \beta_2 p(X_{i,t})^2 + \beta_3 p(X_{i,t})^3 + \nu_{i,t+1} \quad (2),$$

where $Y_{i,t+1}$ is the health or education outcome at follow-up, $Z_{i,t+1}$ represents the contemporaneous individual and household characteristics that may affect education and health outcomes, and δ is the treatment effect of interest. This is the total effect of early pregnancy on outcomes which may contain any indirect effects such as changes in time or money allocation due to pregnancy or different household structure, as well as direct effects of early pregnancy such as biological changes that affect health. We estimate the standard errors of double-robust specification using a bootstrap procedure with 1000 replications.[11]

4. Results

4.1 Main results

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[10] We also perform a regression-based balancing check, estimating the following regression for every j covariate included in the propensity score estimation:

$$X_{i,j,t} = \mu_0 + \mu_1 p(X_{i,t}) + \mu_2 p(X_{i,t})^2 + \mu_3 p(X_{i,t})^3 + \eta_0 EP_{i,t+1} + \eta_1 EP_{i,t+1} p(X_{i,t}) + \eta_2 EP_{i,t+1} p(X_{i,t})^2 + \eta_3 EP_{i,t+1} p(X_{i,t})^3 + u_{i,j,t}$$

We test the joint significance of the coefficients associated with early pregnancy and the interactions between early pregnancy and the propensity scores. If selection on observables is accounted for, then there should be no significant correlation between early pregnancy and any of the baseline characteristics. Indeed, the F-test for the joint significance of the coefficients denoted by η indicates that they are not statistically significant at the 5% significance level for any of the observable characteristics, except for being currently in school and the dummy for age 17.

[11] Both stages of the estimation – the propensity score calculation and the outcome regression – are bootstrapped together.

Table 3 presents the results form an OLS estimation of the effect of early pregnancy, not accounting for any selection into early pregnancy. The results suggest that early pregnancy is associated with a significantly higher probability of high school dropout, lower Raven's test scores and a lower probability of working. While girls who had an early pregnancy are more likely to report having health insurance (possibly because they have more access to health insurance after pregnancy), this does not lead to better physical health outcomes. Early pregnancy is positively correlated with being overweight and anemic, and reporting poor health, and negatively correlated with physical activity. Poor health, lack of physical exercise and the stress of child-bearing and child-rearing could increase mental distress. Yet, early pregnancy does not have any significant effect on mental health. This could be due to a measurement problem or the fact that more than 90% of girls with and without an early pregnancy have mental health scores that are in the normal range (Appendix Table 2). It could also be due to confounding positive effects on mental health, such as better access to health care.

Next, in Table 4, we present the estimated effects of early pregnancy using inverse probability weights. The results are generally consistent with the OLS estimates, suggesting that early childbearing negatively affects education, labor force participation, physical health, and physical activity. Comparing the results in Tables 3 and 4, we find that interestingly, the coefficients on anemia, health insurance, and physical exercise are very similar in both models, implying that there is not much selection based on health behavior or health outcomes, except for being overweight. The estimated effect for being overweight is reduced by 16% from 0.090 to 0.076. Furthermore, there does seem to be a selection problem for education outcomes because the coefficient on dropping out of school is reduced by 24% from 0.272 to 0.206 once we

account for selection bias. The size of the coefficient on cognitive skills is also greatly reduced, and moreover, it loses significance.

In Table 5, we further control for a polynomial of the propensity score in a double robust estimation. The effects of early pregnancy on education outcomes are reduced, although the probability of dropping out of school remains significant at the 5% level. Overall, our preferred specification in Table 5, shows that early pregnancy increases the probability of dropping out of school before completing high school by 15.7 percentage points, or 31% over the mean value (column 1). The lack of statistical significance on test scores suggests that the quality of schooling may be poor and dropping out of school has no impact on skill accumulation (column 2). Alternatively, this result could be explained by girls being able to learn and improve skills at work and outside of school, which is plausible considering that Raven's scores are a measure of general cognition rather than an achievement test. Yet, early pregnancy decreases probability of working by 10.1 percentage points (or 39%), suggesting limited human capital accumulation at work.

In terms of health outcomes, the short-run effect of early pregnancy on the probability of being overweight is reduced and also loses statistical significance (column 4). While the estimated effect is not statistically significant, we cannot rule out the economically significant effect. In particular, the upper bound effect on being overweight is 17 percentage points, using 95% confidence intervals. Girls who had an early pregnancy are 9.2 percentage points more likely to be anemic, which supports previous clinical evidence on the adverse health consequences of early pregnancy (column 5). Early pregnancy significantly reduces both the level and frequency of physical activity, which might increase the risk of being obese or overweight later in life (columns 10 and 11). On the other hand, early pregnancy increases the

probability of obtaining health insurance by14.3 percentage points (or 31%), which might be partly explained by the increased access to health care because of their infant (column 9).

*4.2 Robustness chec*k

In order to test the robustness of the results to the empirical specification, we employ individual fixed effects (FE) estimation as an alternative method using the three waves of the data for a sample of girls ages 15-18 with no prior pregnancy at baseline survey. FE estimation accounts for time-invariant unobservables, such as individual motivation and community access to contraceptives. We control for the same time-varying characteristics as in the main model.

Results, presented in Table 6, are generally consistent with our preferred specification, confirming that early pregnancy increases the probability of dropping out of school and being overweight and anemic, decreases the probability of working, and does not affect mental health. Unlike the double robust propensity score weighted estimation, the effects on exercise are significantly reduced and lose statistical significance.

Next, we explore several mechanisms through which early childbearing may affect education and health.

5. Mechanisms

In order to understand what drives the links between early childbearing and education and health, we add potential mechanisms as additional controls in the double robust propensity score-weighted estimations. If the inclusion of the mechanism reduces (does not alter) the effect of early pregnancy, then the mechanism is more (less) likely to drive the results. Because we find statistically or economically significant effects on school dropout, being overweight, and being anemic, the analysis focuses on exploring the channels for these outcomes.

First, we explore the channels for health outcomes. Teenage childbearing reduces socioeconomic outcomes, including education and labor market outcomes, which in turn adversely affects health. While reduced labor market outcomes might affect health more indirectly, such as reducing demand for health inputs (e.g., healthcare utilization, nutritious foods), reduced education might affect health more directly, such as reducing health relevant knowledge and efficacy in producing positive health outcomes (Cutler and Lleras-Muney 2010; Grossman 2006). Another mechanism is that teenage childbearing might reduce the chances of being married, which might affect health. For example, marriage might lead to good health through greater financial resources to the health of the mother during pregnancy or psychological support. On the other hand, it might lead to bad health through adverse assortative matching outcomes, such as matching with less educated spouses. Finally, teenage mothers might engage in less physical activity and more risky behaviors, which in turn negatively affects health. While there are other channels (e.g., fertility preferences), the data allow us to explore the aforementioned pathways. In particular, the mechanisms explored for health include school dropout, working status, marital status, physical exercise, and health insurance.

Table 7 presents the results. To test whether reduced socioeconomic opportunities can explain the link between early childbearing and health, we add school dropout and working status as controls. The effect of pregnancy on being overweight is significantly reduced after controlling for education, implying that education is an important channel. On the other hand, the effect of early childbearing on being anemic does not change, implying that the reduction in socioeconomic outcomes is not an important channel. The inclusion of marital status does not change the effect of pregnancy on either of the two health outcomes. While adding physical exercise and health insurance reduces the effect on being overweight, it does not affect the

probability of being anemic. These results suggest that the effect of early pregnancy on anemia is not mediated by socioeconomic or health conditions but likely driven by biological factors. However, the effect on being overweight might be partly explained by the reduction in education and physical activity.

Second, we explore the channels for education. While previous literature provides various mechanisms (e.g., increased opportunity cost of education due to pregnancy, child care support), the data allow us to explore labor force participation and marital status. The effect of early pregnancy on education does not change when we control for employment status. The effect is, however, reduced substantially and not significant when we control for marital status. This result suggests that increased probability of household formation might be a channel that underlies the relationship between early pregnancy and education.

6. Long-run implications

We have examined the short-run effects; however, early pregnancy might have long-term consequences. Dropping out of school before completing high school may result in lower wages or chances to be employed later in life and lack of physical exercise may increase the probability of being overweight.

In order to explore the long-run implications of our findings, we compare the outcomes of mothers between the ages of 25 to 49 surveyed in the first MxFLS wave in 2002. More specifically, we compare the outcomes of mothers who had an early pregnancy to those who got pregnant at a later age. Because we do not have information on the baseline characteristics for these older mothers, we could not perform a propensity score weighting estimation. Alternatively, we employ a biprobit regression approach using age at menarche as an instrument for early pregnancy. Age at menarche has been shown to be a significant determinant of and a

plausible instrument for early childbearing (Ribar 1994; Klepinger et al. 1999; Chevalier & Viitanen 2003).

Our long-run analysis explores the effects of early pregnancy separately for mothers at the ages of 25-35 and 35-49 using a biprobit regression model. Table 8 presents the marginal effects for the long-run analysis of early pregnancy using age at menarche as instrument.[12] Results suggest that mothers with early pregnancy are more likely to be overweight later in life. This finding is consistent with the hypothesis that lack of physical exercise as a consequence of early pregnancy might increase the long-term risk of obesity, as well as the risk of other health complications in the future (Chang et al. 2013). On the other hand, while mothers with early pregnancy appear to have an initial increase in the probability of working, we do not find a significant effect on their employment status later in life. One possible explanation for this finding is that younger women might be out of labor force prior to pregnancy while women at older ages might be taking time off work to take care of their infants. Alternatively, while this finding might be a consequence of the insignificant effects on cognitive skills, less education due to early pregnancy might affect wages rather than employment status. We cannot explore this avenue due to lack of reliable data on wages. One caveat of this analysis is that we cannot rule out the possibility of cohort effects. The effects of early pregnancy for older women explored in this section might be different than the effects for younger women in our main analysis. This difference might be a result of the variations in the socioeconomic environment of older women during their adolescence or the different nature of selection bias among different cohorts. While we cannot conclusively rule out cohort effects, the results show that the significant positive effect of early pregnancy on the probability of being overweight persists for both age groups

[12] We find that age at menarche is a strong determinant of early pregnancy for both age groups in the biprobit specification.

(women at the ages of 35 to 49 and women at the ages of 25 to 35 who are closer in age to the sample of women in the short-run analysis). This finding yields support to the validity of our long-run analysis.

7. Conclusion

Despite the reduction in total fertility rates in Mexico, little progress has been made in reducing teenage pregnancy. In order to design effective poverty-reduction policies, it is important to understand the short-run and long-run consequences of early pregnancy and whether early pregnancy is a cause or symptom of socioeconomic disadvantage. There is a vast literature on the effects of early pregnancies on the socioeconomic outcomes of mothers and their children in the developed world but there is little rigorous evidence from developing countries. In addition, while most research has focused on studying the education and labor market outcomes of young mothers or the education and health of their children, the evidence on health outcomes and behaviors of young mothers is limited.

In this paper, we explore the effect of early pregnancy on the education and health of young girls in Mexico. In order to account for selection into early pregnancy that may bias the results, we employ propensity score matching models, namely inverse propensity score weighting and double-robust regression. The results suggest that early pregnancy negatively affects health and health behavior of young girls in the short run. More specifically, early pregnancy increases the probability of being overweight and anemic and reduces physical activity. Moreover, early pregnancy has a significant long-run effect on being overweight. This paper also demonstrates that the effect on being overweight might be partly explained by reduced education and physical exercise. Furthermore, short-run analysis suggests that early pregnancy increases the probability of dropping out of school before completing high school and reduces

the probability of working. Finally, selection bias is strong for education and being overweight since the OLS effects on school dropout and being overweight are significantly reduced and the OLS effect on cognitive skills disappears once we account for selection into pregnancy.

Overall, this paper aims to bring more attention to the relevance of health consequences of early childbearing and pregnancy in designing policies to address poverty. While young mothers could potentially overcome the negative consequences of early childbearing on education through more training over time and catch up to their peers, a deterioration in health may have serious short-term and long-term consequences, which might not be easily overcome.

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Figure 1. Adolescent and Total Fertility Rates (Source: World Bank)

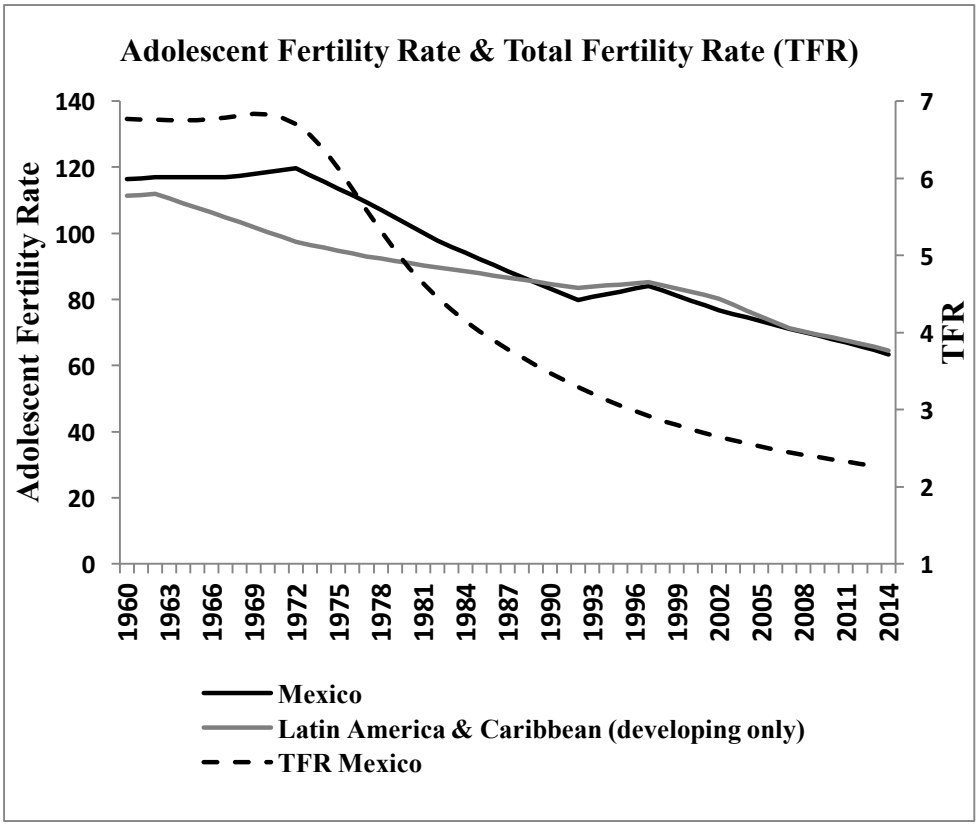
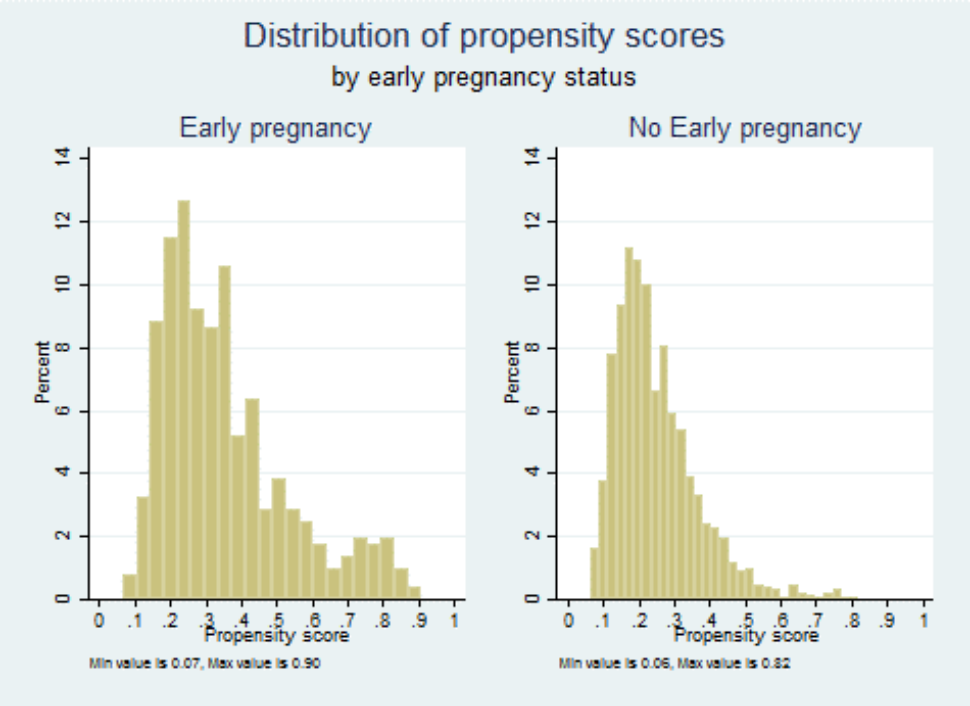


Figure 2: Distribution of propensity scores



Tables

Table 1: Baseline characteristics of girls prior to any pregnancy

	No early pregnancy	Early pregnancy	
			Pvalue
Individual Characteristics			
Age	16.2 (1.05)	16.34 (1.08)	0.008
Age 15	0.33	0.29	0.092
Age 16	0.29	0.25	0.132
Age 17	0.24	0.28	0.045
Age 18	0.14	0.17	0.102
Currently in school	0.69	0.48	<0.001
Working	0.11	0.18	<0.001
Single	0.98	0.91	<0.001
Age at menarche	11.94 (1.17)	11.98	0.484
Ever had sex	0.03	0.15	<0.001
Household Characteristics			
Household size	5.78 (2.1)	5.64 (2.19)	0.219
Household lives in locality with more than 100,000 inhabitants	0.35	0.27	0.001
Household lives in locality with 15,000 to 100,000 inhabitants	0.09	0.1	0.517
Household lives in locality with 2,500 to 15,000 inhabitants	0.12	0.13	0.477
Household lives in locality with less than 2,500 inhabitants	0.44	0.5	0.021
Mother away	0.07	0.15	<0.001
Father away	0.21	0.29	<0.001
Household owns a house	0.87	0.84	0.078
Household owns a car	0.4	0.32	0.001
Household owns a washing machine	0.89	0.88	0.294
Household owns domestic appliances	0.89	0.85	0.009
Observations	1338	521	

Notes:
[1] Mean (std) for continuous variables; Proportions for discrete variables; P-values calculated using a t-test.

Table 2: Internal Balancing Test - Baseline Characteristics after weighting by the inverse propensity score

	Difference (Early Pregnancy - Not)	SE	t-Statistic
Individual Characteristics			
Age 16 at baseline	0.007	0.028	0.27
Age 17 at baseline	0.011	0.025	0.46
Age 18 at baseline	-0.03	0.02	-1.53
Currently in school	-0.022	0.028	-0.79
Working	-0.022	0.018	-1.24
Single	-0.016	0.011	-1.47
Age at menarche	0.005	0.067	0.07
Ever had sex	0.023*	0.014	1.67
Household Characteristics			
Household size	0.03	0.129	0.24
Household lives in locality with more than 100,000 inhabitants	-0.024	0.028	-0.87
Household lives in locality with 15,000 to 100,000 inhabitants	-0.011	0.016	-0.69
Household lives in locality with 2,500 to 15,000 inhabitants	0.002	0.019	0.13
Household lives in locality with less than 2,500 inhabitants	0.033	0.03	1.11
Mother away	0.003	0.016	0.20
Father away	0.007	0.024	0.31
Household owns a house	-0.015	0.021	-0.70
Household owns a car	-0.012	0.029	-0.42
Household owns a washing machine	-0.003	0.017	-0.19
Household owns domestic appliances	-0.011	0.017	-0.61

Notes:
[1] Internal balancing test based on a regression model weighted with the inverse propensity score weights. Each number is from a separate regression of the variable on an indicator for early pregnancy.
[2] Variables included are those used in the propensity score. Additional variables in the propensity score model not presented here are State Fixed Effects and Year Fixed Effects.

Table 3: OLS - restricted to sample used in PS matching analysis

	Education and Labor market outcomes			Physical health outcomes			Mental Health outcomes		Health Behavior		
	School dropout (1)	Raven's test score (% correct) (2)	Working (3)	Overweight (BMI ge 25) (4)	Anemic (5)	Reports good health (6)	Mental distress score (7)	Normal range of mental distress score (8)	Has health insurance (9)	Exercises (10)	Exercise frequency (11)
Early pregnancy	0.272**	-3.673**	-0.0840**	0.0904**	0.0892**	-0.0480*	-0.513	0.00335	0.0981**	-0.0797**	-0.322**
	(0.0247)	(1.339)	(0.0233)	(0.0308)	(0.0241)	(0.0269)	(0.415)	(0.0157)	(0.0275)	(0.0187)	(0.0729)
Age	-0.00339	-0.0164	0.0270**	0.0214*	-0.00267	-0.00417	-0.271	0.00686	-0.00165	-0.0137*	-0.0487
	(0.00965)	(0.523)	(0.00940)	(0.0113)	(0.00861)	(0.00978)	(0.169)	(0.00604)	(0.0105)	(0.00788)	(0.0320)
Household owns a house	-0.00241	0.984	0.00690	0.000774	0.0243	0.0213	-0.261	0.0107	-0.0128	-0.00694	-0.0422
	(0.0296)	(1.600)	(0.0286)	(0.0354)	(0.0254)	(0.0318)	(0.541)	(0.0208)	(0.0329)	(0.0247)	(0.0961)
Household owns a car	-0.131**	5.515**	-0.0632**	-0.0767**	0.0196	0.0643**	-0.218	0.0130	0.0788**	0.00787	0.0147
	(0.0261)	(1.288)	(0.0248)	(0.0297)	(0.0249)	(0.0268)	(0.416)	(0.0146)	(0.0298)	(0.0211)	(0.0834)
Household owns a washing machine	-0.110**	5.341**	-0.0693*	0.00442	-0.0496	0.0460	1.135	-0.0615**	0.116**	0.0331	0.0693
	(0.0403)	(2.127)	(0.0389)	(0.0480)	(0.0379)	(0.0449)	(0.693)	(0.0265)	(0.0402)	(0.0261)	(0.108)
Household owns domestic	-0.0724**	4.318**	0.0541	0.0533	8.48e-05	0.00335	-1.070	0.0796**	-0.0111	0.0440*	0.187**
	(0.0366)	(1.921)	(0.0337)	(0.0436)	(0.0343)	(0.0406)	(0.781)	(0.0301)	(0.0380)	(0.0233)	(0.0869)
Household size	0.0227**	-0.713**	2.05e-05	-0.00451	-0.000170	-0.00523	-0.0675	0.000391	-0.00706	-0.00376	-0.0200
	(0.00431)	(0.240)	(0.00430)	(0.00536)	(0.00413)	(0.00499)	(0.0747)	(0.00267)	(0.00498)	(0.00369)	(0.0136)
Survey year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Locality population size FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,803	1,421	1,799	1,452	1,106	1,597	1,593	1,593	1,598	1,598	1,598
R-squared	0.193	0.132	0.037	0.047	0.055	0.057	0.040	0.036	0.117	0.059	0.061

Notes:
[1] Robust standard errors in parentheses.
[2] * denotes significance at the 10% level, ** denotes significance at the 5% level

Table 4: Inverse probability weighting

	Education and Labor market outcomes			Physical health outcomes			Mental Health outcomes		Health Behavior		
	School dropout (1)	Raven's test score (% correct) (2)	Working (3)	Overweight (BMI ge 25) (4)	Anemic (5)	Reports good health (6)	Mental distress score (7)	Normal range of mental distress score (8)	Has health insurance (9)	Exercises (10)	Exercise frequency (11)
Early pregnancy	0.206**	-1.975	-0.0874**	0.0755**	0.0929**	-0.0491*	-0.464	0.00551	0.124**	-0.0854**	-0.345**
	(0.0283)	(1.417)	(0.0263)	(0.0327)	(0.0258)	(0.0290)	(0.420)	(0.0162)	(0.0293)	(0.0190)	(0.0737)
Age	-0.0102	0.525	0.0232**	0.0261**	-0.00719	0.000710	-0.269	0.00371	0.00444	-0.0100	-0.0406
	(0.0116)	(0.583)	(0.0113)	(0.0127)	(0.00942)	(0.0109)	(0.165)	(0.00606)	(0.0115)	(0.00737)	(0.0298)
Household owns a house	0.00178	2.464	-0.0167	-0.0371	0.0366	-0.00790	0.00438	0.0256	-0.0371	-0.0101	-0.0679
	(0.0366)	(1.787)	(0.0349)	(0.0395)	(0.0285)	(0.0366)	(0.549)	(0.0246)	(0.0361)	(0.0243)	(0.0926)
Household owns a car	-0.122**	4.527**	-0.0411	-0.0686**	0.0170	0.0554*	-0.494	0.0189	0.0850**	0.00418	-0.00925
	(0.0308)	(1.407)	(0.0314)	(0.0346)	(0.0291)	(0.0314)	(0.415)	(0.0142)	(0.0329)	(0.0203)	(0.0795)
Household owns a washing machine	-0.0864	4.567**	-0.0831*	-0.0314	0.000480	0.0206	0.823	-0.0511*	0.0613	0.0468**	0.139
	(0.0539)	(2.164)	(0.0476)	(0.0555)	(0.0360)	(0.0514)	(0.693)	(0.0280)	(0.0491)	(0.0217)	(0.0852)
Household owns domestic	-0.0610	4.817**	0.0538	0.0720	-0.0230	0.0168	-0.659	0.0610*	0.00984	0.0517**	0.217**
	(0.0450)	(1.940)	(0.0443)	(0.0494)	(0.0368)	(0.0488)	(0.723)	(0.0313)	(0.0468)	(0.0197)	(0.0711)
Household size	0.0238**	-0.596**	0.00106	-0.00263	0.00364	-0.00230	-0.0382	6.39e-06	-0.00601	-0.00225	-0.0137
	(0.00495)	(0.278)	(0.00503)	(0.00607)	(0.00543)	(0.00566)	(0.0780)	(0.00325)	(0.00556)	(0.00365)	(0.0134)
Survey year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Locality population size FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,803	1,421	1,799	1,452	1,106	1,597	1,593	1,593	1,598	1,598	1,598
R-squared	0.148	0.125	0.040	0.051	0.063	0.055	0.043	0.043	0.145	0.071	0.075

Notes:
[1] Robust standard errors in parentheses.
[2] * denotes significance at the 10% level, ** denotes significance at the 5% level

Table 5: Double Robust Propensity score matching analysis - outcomes

	Education and Labor Market outcomes			Physical Health Outcomes			Mental Health Outcomes		Health Behaviors		
	School dropout (1)	Raven's test score (% correct) (2)	Working (3)	Overweight (BMI ge 25) (4)	Anemic (5)	Reports good health (6)	Mental distress score (7)	Normal range of mental distress score (8)	Health Insurance (9)	Exercises (10)	Exercise Frequency (11)
Early pregnancy	0.157**	-0.639	-0.101**	0.0702	0.0920**	-0.064	-0.444	0.0032	0.143**	-0.077**	-0.313**
	(0.0465)	(2.3742)	(0.0474)	(0.0538)	(0.0407)	(0.0491)	(0.6937)	(0.028)	(0.0474)	(0.0332)	(0.1325)
Age	-0.037**	0.971	0.0172	0.0236	-0.011	-0.004	-0.299	0.0044	0.0147	-0.008	-0.030
	(0.0182)	(0.9013)	(0.0176)	(0.0203)	(0.0146)	(0.0181)	(0.256)	(0.0097)	(0.0176)	(0.0116)	(0.046)
Household owns a house	0.0091	2.323	-0.011	-0.039	0.0326	0.0107	-0.113	0.0312	-0.033	-0.014	-0.080
	(0.0561)	(2.7395)	(0.0529)	(0.0622)	(0.048)	(0.057)	(0.8781)	(0.0374)	(0.0549)	(0.0385)	(0.1499)
Household owns a car	-0.066	3.521	-0.028	-0.063	0.0259	0.0364	-0.429	0.0176	0.0615	0.0003	-0.032
	(0.0496)	(2.1813)	(0.0461)	(0.0525)	(0.0467)	(0.0531)	(0.6867)	(0.0236)	(0.0508)	(0.0348)	(0.1392)
Household owns a washing	-0.098	4.682	-0.087	-0.030	-0.002	0.0529	0.853	-0.0537	0.0676	0.0482	0.148
machine	(0.0746)	(3.3148)	(0.0714)	(0.0834)	(0.059)	(0.0763)	(1.0862)	(0.0451)	(0.0717)	(0.0354)	(0.1396)
Household owns domestic	-0.032	4.399	0.0622	0.0674	-0.021	-0.047	-0.733	0.0665	0.0011	0.0488	0.201*
	(0.0612)	(3.0056)	(0.062)	(0.0766)	(0.0621)	(0.0715)	(1.1521)	(0.0473)	(0.0702)	(0.0337)	(0.1215)
Household size	0.0271**	-0.704	0.0022	-0.003	0.00403	-0.007	-0.059	0.0014	-0.007	-0.003	-0.01
	(0.0079)	(0.4418)	(0.0076)	(0.0098)	(0.0084)	(0.0087)	(0.1226)	(0.0052)	(0.0084)	(0.0059)	(0.0225)
Propensity score	1.980**	-36.12**	0.670	-1.203**	1.769**	1.586**	-15.68**	1.314**	-1.639**	-0.035	-2.181**
	(0.0564)	(2.3216)	(1.9735)	(0.0543)	(0.0486)	(0.051)	(0.7738)	(0.0305)	(0.0532)	(0.0341)	(0.1313)
Squared propensity score	0.0952	16.36	-0.592	3.252	-3.046	-3.146	46.38	-3.365	1.785	-0.001	3.780
	(4.8444)	(185.2848)	(4.627)	(4.5379)	(3.5332)	(4.6708)	(61.419)	(2.6134)	(4.5189)	(2.8859)	(11.9822)
Cubed propensity score	-1.541	4.865	0.152	-2.404	1.626	1.833	-37.22	2.513	-0.527	-0.074	-2.44
	(3.3195)	(127.2754)	(3.3063)	(3.1274)	(2.369)	(3.2365)	(41.3718)	(1.7382)	(3.1444)	(1.9625)	(8.1119)
Survey year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Locality population size FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes:
[1] Regression Models are based on a double robust regression with propensity scores as the inverse probability weights. Standard errors in parentheses are bootstrapped with 1,000 replications.
[2] * denotes significance at the 10% level, ** denotes significance at the 5% level

Table 6: Individual Fixed Effects analysis

	Education and labor market outcomes			Physical health			Mental health		Health behaviors		
	School dropout (1)	Raven's test score (% correct) (2)	Employed (3)	Overweight (BMI ge 25) (4)	Anemic (5)	Reports good health (6)	Mental distress score (7)	Normal range of mental distress score (8)	Has health insurance (9)	Exercises (10)	Exercise frequency (11)
Early pregnancy	0.0878***	-2.276	-0.138***	0.147***	0.113***	-0.0369	-1.415***	0.0251	0.184***	-0.0417	-0.163
	(0.0252)	(1.505)	(0.0294)	(0.0290)	(0.0375)	(0.0363)	(0.494)	(0.0199)	(0.0351)	(0.0271)	(0.109)
Age	0.0337	0.111	0.0171	-0.0270	-0.0219	-0.0434	-1.797***	0.0576***	0.0326	-0.0333	-0.0682
	(0.0229)	(1.391)	(0.0258)	(0.0255)	(0.0412)	(0.0367)	(0.602)	(0.0215)	(0.0325)	(0.0284)	(0.115)
Household owns a house	0.0152	2.570*	0.0222	-0.00572	0.0437	0.00974	-0.0275	-0.0166	0.0212	0.0214	0.0460
	(0.0257)	(1.474)	(0.0289)	(0.0312)	(0.0377)	(0.0353)	(0.620)	(0.0246)	(0.0348)	(0.0282)	(0.110)
Household owns a car	0.0371*	0.657	0.0143	-0.0260	0.0309	0.0109	-0.513	0.0350**	0.0464	-0.00107	0.00421
	(0.0209)	(1.324)	(0.0231)	(0.0219)	(0.0310)	(0.0310)	(0.499)	(0.0172)	(0.0290)	(0.0253)	(0.0997)
Household owns a washing	-0.0307	-0.629	-0.0877**	0.00912	-0.0412	-0.0434	0.0295	-0.0125	0.0446	0.0298	0.0336
machine	(0.0307)	(1.907)	(0.0363)	(0.0334)	(0.0450)	(0.0502)	(0.601)	(0.0252)	(0.0423)	(0.0341)	(0.127)
Household owns domestic	-0.0296	-2.424	0.0666**	-0.0113	-0.00422	-0.0235	-0.551	0.0327	0.0213	-0.0148	0.0181
appliances	(0.0291)	(1.738)	(0.0301)	(0.0291)	(0.0452)	(0.0428)	(0.699)	(0.0276)	(0.0378)	(0.0297)	(0.109)
Household size	-0.00143	0.0641	0.00526	-0.00588	-0.00695	0.0123	-0.0887	0.00761	-0.0179**	-8.22e-05	0.00736
	(0.00581)	(0.334)	(0.00715)	(0.00659)	(0.00821)	(0.00781)	(0.123)	(0.00479)	(0.00821)	(0.00618)	(0.0237)
Survey year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Locality population size FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.119	0.029	0.079	0.123	0.049	0.015	0.050	0.030	0.075	0.029	0.025
Number of individuals	1,814	1,391	1,810	1,301	765	1,536	1,526	1,526	1,536	1,536	1,536

Notes:
[1] Regression Models are based on an individual fixed effects analysis. Standard errors in parentheses.
[2] * denotes significance at the 10% level, ** denotes significance at the 5% level

Table 7: Propensity score matching analysis - mechanisms

Outcome	Main Result	Mechanisms					
		School dropout	Working	Single	Exercises	Exercise Frequency	Health Insurance
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Overweight (BMI ge 25)	0.0702	0.055	0.072	0.073	0.059	0.060	0.062
	(0.0538)	(0.055)	(0.0544)	(0.0672)	(0.0553)	(0.0553)	(0.0558)
Anemic	0.0920**	0.099**	0.093**	0.115**	0.091**	0.090**	0.090**
	(0.0407)	(0.0412)	(0.041)	(0.0526)	(0.041)	(0.0409)	(0.0415)
School Dropout	0.157**	-	0.168**	0.083	-	-	-
	(0.0465)		(0.0475)	(0.0556)			

Notes:
[1] Regression Models are based on a double robust regression with propensity scores as the inverse probability weights. Standard errors in parentheses are bootstrapped with 1,000 replications.
[2] * denotes significance at the 10% level, ** denotes significance at the 5% level
[3] Column 1 presents the estimate of the effect of early pregnancy on the key outcomes using the double robust estimation as presented in Table 5. Columns 2 through 7 use the same model as in Table 5 but also include a control for each of the mechanisms being tested.

Table 8: Long-run effects of early pregnancy - Biprobit analysis

Sample	Overweight (BMI ge 25)	Working
Between 25 and 35 in 2002	0.484**	0.459**
	(0.0177)	(0.00663)
Older than 35 in 2002 (i.e., between 35 and 49)	0.437**	-0.0329
	(0.0318)	(0.164)

Note:

[1] Coefficients are marginal effects calculated from biprobit regressions, where age at menarche is used as an instrument for early pregnancy.

[2] Each of the biprobit regressions control for age, household ownership of house, car, washing machine, domestic appliances, household size, locality population size FE, state FE.

[3] * denotes significance at the 10% level, ** denotes significance at the 5% level

Appendix Table 1: Comparison of baseline characteristics of women in the analysis sample and women with attrition or non-response at baseline

	Women in analysis sample	Women with attrition	Women with non-response
Individual Characteristics			
Age	16.23	16.39	16.29
Currently in school	0.63	0.58	0.59
Working	0.13	0.16	0.18
Single	0.96	0.94	0.93
Age at menarche	11.95	12.31	12.23
Ever had sex	0.07	0.1	0.07
Household Characteristics			
Household size	5.74	5.61	5.94
Household lives in locality with more than 100,000 inhabitants	0.33	0.44	0.41
Household lives in locality with 15,000 to 100,000 inhabitants	0.09	0.11	0.08
Household lives in locality with 2,500 to 15,000 inhabitants	0.12	0.1	0.14
Household lives in locality with less than 2,500 inhabitants	0.46	0.35	0.38
Mother away	0.09	0.18	0.1
Father away	0.23	0.37	0.23
Household owns a house	0.86	0.72	0.84
Household owns a car	0.38	0.37	0.34
Household owns a washing machine	0.89	0.89	0.86
Household owns domestic appliances	0.88	0.89	0.84
Observations	1859	303	227

Appendix Table 2: Descriptive statistics of survey outcomes at endline

	No early pregnancy	Early pregnancy	
			Pvalue
Dropped out of school	0.42	0.72	<0.001
Raven's test score (% correct)	62.64 (21.88)	56.72 (21.47)	<0.001
Overweight (BMI ge 25)	0.33	0.43	<0.001
Anemic	0.1	0.16	0.002
Reports good health	0.73	0.67	0.009
Mental distress score	25.47 (7.79)	25.27 (6.37)	0.602
Normal range of mental distress score	0.93	0.92	0.641
Has health insurance	0.43	0.55	<0.001
Exercises	0.18	0.1	<0.001
Exercise frequency	0.66 (1.54)	0.37 (1.18)	<0.001

Notes:

[1] Mean (std) for continuous variables; Proportions for discrete variables; P-values calculated using a t-test.

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