Intergenerational replication of teenage pregnancy and educational lag in Mexico

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Abstract

Using data from the Mexican National Survey of Demographic Dynamics (ENADID) 2009 and combining a quasi-experimental approach and structural equation modeling, this paper analyzed the causal relationship between teenage pregnancy and their educational lag using the intergenerational transmission of teenage pregnancy (TPR) between mothers and daughters as a mediator of this relationship. We found strong evidence of TPR intergenerational replication and its impact on educational lag. Possible paths include socioeconomic status and community social deprivation. It is relevant to increase efforts to prevent TPR for empowering teenage women to decide on their reproductive health and thus, increase their chances of increasing their human capital accumulation for them and future generations.

Keywords: Teenage pregnancy, intergenerational transmission, educational lag, Mexico.

1. Introduction.

In the last fifty years, the global rate of teenage pregnancy (TPR) has been reduced by 47.4%, decreasing from 87.4 to 46.0 births per 1,000 females aged 15 to 19 (The World Bank 2013). Decreases were more prominent in the Middle East, North Africa, South-East Asia and the Pacific (74.4 y 71.0% respectively), and less significant in Sub-Saharan Africa (Sub-SA), and the Latin America and Caribbean region (LAC) (26.8 and 33.4% respectively). In Mexico this rate decreased by 44.6%. Despite these reductions in teenage pregnancy rates in Sub-SA and LAC, these continue being 3.4 to 3.6 times higher than those estimated for Europe and developed countries in general. In the LAC region, in 2011, Nicaragua and the Dominic Republic showed the highest TPR (>100) while Cuba, Haiti and Puerto Rico presented the lowest TPR (<50). The same year, Mexico's TPR was estimated at 64.6, similar to rates in Chile, Costa Rica, Paraguay and Uruguay.

Teenage pregnancy is a complex social phenomenon. Possible determinants of TPR include individual, household and social characteristics (Lauglo 2008). The lack of adequate sexual education, limited access to family planning and sexual health services and unsafe sexual practices (Ferre, Gerstenbluth et al. 2011, Stern 1997, Stanger, Hall 2011) are linked to the deficiencies of the education and health systems to provide the necessary information and resources to empower young women to take decisions with respect to their reproductive health. Other aspects linked to TPR are the individual's social and economic context, including the family conditions, race, cultural values, believes and the degree of social and family support of the adolescent mother (South, Crowder 2010, Rani, Lule 2004, Horn 1983, Kao, Loveland et al. 2011, Villarruel 1998, Turner, Grindstaff et al. 1990). All these aspects together represent an obstacle to ensure that young women can decide on when to get pregnant and how to face unwanted pregnancies.

Regarding the consequences of TPR, different aspects have been identified as negative effects on young women because of TPR. From a social perspective, one of the most important short term consequences is the teenage women risks of schooling dropout: a study showed that TPR reduced up to 37% the possibility for teenage girls to attend and complete middle-school and consequently reduces social opportunities, limits life projects and living conditions for them and their kids. The medium term consequence is the reduced opportunity of young women to participate in the labor market, and hence to access economic and social resources needed for proper child development and social mobility (Castro, Juarez 1995).

In terms of health, various studies have underlined the health risks for both the mother and the child (Raneri, Wiemann 2007, Gogna, Binstock et al. 2008, Stern 1997, Harper, Marcus et al. 2003). These include increased risks of maternal mortality and morbidity [for example obstetric fistula (Muleta, Rasmussen et al. 2010, Rijken Y., Chilopora 2007), post-abortion complications (Shah I., Ahman E. 2012), STIs -including HIV/AIDS (World Health Organization 2009, Dehne, Riedner 2005)-], as well as increased neonatal risks (World Health Organization 2011) and psychosocial problems such as depression (United Nations Population Fund, UNFPA. 2013, Gavin, Lindhorst T. et al. 2011, Sieving, Bush 2012, Silverman, Loudon 2010). Some studies suggest that the risk of maternal death among teenagers under 16 is four times higher than for women ages 20 to 30, while neonatal mortality is about 50% higher among teenage than women ages 20 to 30 (Organización Mundial de la Salud, OMS. 2009). In addition, TP is strongly linked with unsafe abortion: Data for the LA region shows that 95% of

all abortions performed in the region in 2008 were performed in unsafe conditions, out of which 14% involved teenage girls ages 12 to 19 (Sedgh, Singh et al. 2012). Looking at the psychological effects of TP, some research has shown that prevalence rates of post-natal depression among adolescent mothers are two times higher with respect to the general population (Gavin, Lindhorst T. et al. 2011, Silverman, Loudon 2010). The link between TP and history of child abuse has also been shown. Studies suggest that TP could influence the cognitive and psychological capacities of the child, influence his/her social interactions and lead to increased risk of abuse and child negligence (Sieving, Bush 2012).

Teenage pregnancy has a recognized impact at macroeconomic level. It alters the teenagers' possibility to access better education, leading to higher unemployment, and higher costs for the social protection system. It also leads to increased loss in terms of human capital accumulation (Chaaban, Cunningham 2011). Recent data suggests that the life-long opportunity cost related to TPR could account for respectively 1 and 30% of the annual GDPs of China and Uganda. In addition to this economic loss, other non-monetary factors also need to be considered, such as loss of future productivity or the social costs borne by teenage mothers (Cunningham, McGinnis et al. 2008). This suggests that TPR could act as a reproduction vector for poverty and social vulnerability (Zeck, Bjelic et al. 2007, Gipson, Koenig et al. 2008, Stern 1997, Sagili, Pramya et al. 2012).

Despite a general decline of TPR prevalence across the world, important variations within and across regions still remain. The issue has become particularly important because of its numerous links with poverty and gender inequalities, including gender-based violence, reduced opportunities, and reduced health outcomes both for the mother and the child including maternal health risks and impaired physical and cognitive development of the child.

There is limited evidence of the extent to which TPR can act as a mechanism of intergenerational transmission of poverty. In particular, we have little understanding of the causal mechanisms involved in the transmission of TPR between generations, and its impact on human capital accumulation. Most studies have approached this topic using qualitative methods or only explored the statistical association between TPR and school dropout (as a proxy of long term capital accumulation).

Using a quasi-experimental approach and structural equation modeling, the main objective of this paper is to analyze the causal relationship between teenage pregnancy and their educational lag using the intergenerational transmission of teenage pregnancy between mothers and daughters as a mediator of this relationship. In other words, we presume there is a greater likelihood for teenage women to get pregnant when their mothers have antecedents of being pregnant at early ages given that the lack of women's empowerment over reproductive health decisions are transmitted between generations. The first part of this paper describes data and variables. The second part explains the econometric approach used to analyze the endogenous relationship between teenage pregnancy and their educational lag. The third section provides description of the main results and finally last section shows general conclusion and discussion about the consequences of teenage pregnancy.

3. Methods.

3.1 Data.

Data were drawn from the 2009 wave of the *Encuesta Nacional de la Dinámica Demográfica* (ENADID), a nationally representative survey fielded by Mexico's Instituto Nacional de Estadística y Geografía that uses a two-stage stratified probability sample from Mexico's 31 states and its federal district of Mexico City (N=343,887) (Instituto Nacional Nacional de Estadística y Geografía de México, INEGI. 2011). This wave includes survey modules covering household composition and characteristics, and demographic, education and health information on all household members. In addition, ENADID includes a reproductive health module to be completed by each woman aged 12–54 residing in the household (N=112,159). Data are therefore a combination of household and individual-level information.

The population of interest are teenagers aged 12-19 in 2009, which were daughters of the household head, and residents of nuclear or extended households that include the wife or husband of the household head among his residents (N=19,723). After excluding teenagers with incomplete basic socio-demographic information, the final sample included 18,942 individuals (N=5,877,622; non-response rate ~4%). Descriptive statistics were obtained for the whole final sample but effects were estimated in teenagers 15 to 19 years old since information on use of contraceptive methods were available only for this age group (n=10,634; N=3,280,662).

3.2 Main variables.

Three variables: (i) Teen pregnancy (TPR) (dichotomous, yes=1, no=0) that identifies women aged 12-19 in 2009 who reported at least one pregnancy.(ii) Educational lag; following the national institute of geographic and statistics from Mexico (*Instituto Nacional de Estadística, Geografía e Informática*, INEGI. 2004), this variable was constructed from the accumulated schooling and the educational potential relative to their age (according to the mexican educational system). For example, a teen aged 15 should theoretically reach nine years of schooling in case that the teenager reported less schooling, she would be classified as having educational lag. Two lag levels were analyzed: ≥1 yr. and ≥2 yrs. (both defined binary, yes=1, no=0). (iii) Mother's TPR was defined categorically (=1, 2 or 3 if first pregnancy happened at<16, 16-19 or >19 yrs. respectively). A key assumption in this definition is that the wife/spouse of the household head is the mother of the teen, in case this person is not the head of household (~70%).

3.3 Covariates.

Three groups of covariates are included: (i) Individual level (teenage woman): years of age, place of birth, having health insurance [Social Insurance, *Seguro Popular* (Sosa-Rubí, Galárraga et al. 2009), or without health insurance]. (ii) Household level: gender, age and employment status

of the household head, the maximum number of years of schooling, the number of equivalent adults to approximate size and composition of the household (Teruel, Rubalcava et al. 2005), the type of household (nuclear or extended)[††]-; ethnic group condition (indigenous/non-indigenous) was defined according to the official definition in Mexico (*Comisión Nacional de Desarrollo de los Pueblos Indígenas*, CDI. 2009), whereby a household is considered indigenous if the head of the family, a spouse and/or an ascendant self-identifies and speaker of an indigenous language. Following this official definition we created a binary variable at the household level; access to social programs that provides economic support to the family, cash transfers program for older adults, and support for single mothers (including conditional cash transfers Oportunidades program, Farmers Direct Support Program or PROCAMPO), and an index that indicates the socioeconomic status (SES). The information to ascertain the SES included possession of different assets, access to public services and housing characteristics. The SES index was constructed using a principal components analysis with polychoric correlation matrices (Kolenikov, Angeles 2004, McKenzie 2005), therefore more positive scores indicate better SES conditions, while those with more negative scores have a worse conditions. (iii) Locality characteristics: the place of residence and size of locality: rural, (<2500 inhab.), urban (2500-99999 inhab.) and metropolitan (>100,000 inhab.).

3.4 Econometric approach.

Effect of teenage pregnancy on educational lag

We want to analyze the effect of teenage pregnancy on educational lag. As it has been remarked in the literature being an adolescent mother is a characteristic that depends on observable and unobservable events that could determine both being pregnant and leaving school at early age. This problem of endogeneity has important implications on identifying the casual effect of early childbearing on educational lag. In order to alleviate potential endogenous selection problems and confounding effects, three econometric approaches were performed: First, a naïve model using a probit estimation was used to analyze the relationship between teenage childbearing and educational lag. Second, propensity score matching method was applied to reduce the systematic differences between teenage women with and without pregnancies based on observable variables. Third, a structural model was applied to account not only for observable differences between these two groups of teenage women but also unobservable differences that could also bias the estimations.

Propensity Score Matching (PSM)

In order to reduce the potential bias resulting from the systematic differences between teenage women with a pregnancy vs. teenage women without a pregnancy, we matched females who got pregnant during their adolescence to those who did not. We estimated a propensity score based on observable characteristics of both groups (Ferre, Gerstenblüth et al. 2013, Ranchhod, Lam et al. 2011, Levine, Painter 2003). We intend to improve the causal inference from our

[††] Nuclear households are composed of the head of household, spouse and/or children. Extended households include member of the nuclear family and other family members (uncle, aunt, grandmother, grandfather, etc.) or members with no blood links.

observational study, reducing the potential bias explained by systematic differences between teenage with antecedents of a pregnancy and without antecedents of a pregnancy. This method allows us to build a valid teenage comparison group and to compare similar teenage women with respect to observable characteristics with the exception of having a pregnancy. The main assumption behind this method is that observable characteristics present before the pregnancy occurred removes observable differences between teenage women with and without antecedents of being pregnant.

The propensity score can be defined as the conditional probability of being teenage having a pregnancy given pre-event (the event is being pregnant) characteristics: $p(X)=Pr[D=1|X]$, where $D=\{0,1\}$ is the indicator of randomly exposure to TPR and X is the multidimensional vector of pre-event characteristics (Rosenbaum, Rubin 1983). If the event is random within cells defined by X, it is also random within cells defined by the values of the mono-dimensional variable $p(X)$. TPR occurs non-randomly as it is concentrated among the disadvantaged subpopulation. This selection bias problem points out that one should estimate the causal effect of TPR for young women who experienced it (average event for TPR-*ATT*) (Dehejia, Wahba 2002, Harding 2003). Given a population of units denoted by i, if the propensity score $p(Xi)$ is known the *ATT* can be estimated as follows: $ATT=E[Y_{1i} - Y_{0i} \mid Di=1]$ where the outer expectation is over the distribution of $(p(X_i)|D_i=1)$ and Y_{1i} and Y_{0i} are the potential outcomes in the two counterfactual situations of (respectively) teenage with a previous pregnancy and teenage with not previous pregnancy. In other words, we estimated the impact of an event of pregnancy using very similar teenage women in terms of observable characteristics. The nearest neighborhood (NN) matching is a frequently used matching estimator. For each TPR the closest in terms of propensity score in the group of Non-TPR is chosen. Using caliper=0.01, common support in order to avoid matching by a neighbor very far from the treated individual but with the closed propensity score we contrasted the NN matching without replacement with the so called kernel and radius matching (Dehejia, Wahba 2002). Both algorithms for the matching were done by covariables mentioned above. Additional analysis (not shown) suggested that that the matching processes (among all algorithms) satisfied the balancing property.

Structural equation model (SEM)

A structural equation model (Paxton, Hipp et al. 2011) was specified with TPR determining educational lag. Additional endogenous variables included were level of education attained by each household, household socioeconomic level (SES) and access to social programs by women. The remaining covariates, described above, were specified as exogenous (Figure 1). The first advantage of using SEM is that make it possible to measure observable and non-observable variables that can generate a spurious correlation between TPR and educational lag. The second advantage is that is possible to propose a bidirectional path for the relationship between educational lag and TPR using two instrumental variables: first, the non-use of contraceptive in the first sexual relationship (as a proxy of woman's ability to make decisions about their reproductive health) and second, the TPR teenage woman's mother (mother's pregnancy indicator of pregnancy at ages <16 yrs or at ages 16 to 19 yrs) as a proxy of trans-generational effect of reproductive health decisions. We therefore allowed educational lag to be explained by TPR but also TPR to be explained by educational lag.

We performed a test based on Hansen's J statistic for validity of instruments (Hansen 1982), a test based on the partial R-squared (Bound, Jaeger et al. 1995) and the Stock and Yogo test (Stock, Yogo 2005) for weak instruments using the equation for educational lag as the main equation and TPR as instrumented. We did not reject the null of valid instruments ($p=0.67$) and rejected the null of week instruments ($p<0.01$). These results indicated that TPR of the teenage woman's mother and non-use of contraceptive in the first sexual relationship were good instruments, these instruments may also be theoretically adequate since they are not expected to explain educational lag directly but through their causal association through mediators such as TPR. Bidirectional paths were also specified for the relationship between teenage access to social programs and SES since one of the criteria for program eligibility may be directly related to SES.

Teen pregnancy transmission and its indirect effect on educational lag

We estimated direct, indirect and total effects for each endogenous variable. Of especially interest to our hypotheses are the total effect (direct+indirect) of TPR of the teenage woman's mother on TPR of the daughter and the indirect effect between TPR of the mother on educational lag. At the household level, TPR of the mother may result in a lower maximum attainted education and a lower SES. It may also directly and indirectly (through the aforementioned household level variables) increase the probability of TPR. These effects may in turn be related to the probability of educational lag. We present results for educational lag defined as ≥2 yr. and an additional definition of educational lag as ≥1 yrs. gave the same qualitative results. Total effects for both models in terms of percentage points were also calculated. In order to compare these effects with naïve probit model and propensity score matching methods, the base probabilities were assumed with certainty and standard errors were approximated assuming symmetric confidence intervals at the predicted probabilities. These results in somewhat lower standard errors compared to those that would be obtained without assuming certainty base probabilities but serves for the purpose of comparing effect sizes between methods.

SEM analyses were conducted in Mplus v7.1 using the weighted least-squares with mean and variance adjustment method of estimation and the theta parameterization (Muthén, Muthén 2012). Coefficients for binary endogenous variables were expressed in the probit scale. All other statistical analyses, including probit regression and propensity score matching, were conducted in Stata v13.1. All estimates were adjusted by the survey design except for the matching methods where dependencies in data are induced by the matching method.

4. Results.

Table 1 shows the percentage of teenager's pregnancy and the educational lag greater or equal to 1 year and educational lag greater of equal to two years by different groups of age. The prevalence of TPR was 2.61% (0.14% in teenagers aged 12-14yrs. and 4.49% in teenagers aged

15-19 yrs.). Approximately 60% of TP had one year (average=1.8yrs.) or more educational lag and approximately 22% TPR was lagged by two years or more (average=3.2 yrs.).

Table 2 shows main socioeconomic characteristics by teenage women with previous pregnancies and teenage without pregnancies. Compared to teenagers that have never been pregnant (Non-TPR), teenagers who were pregnant at some point (TPR), were older, 78% reported no use of contraception method in their first sexual intercourse. A greater percentage of TPR reported not having health insurance of any kind. Related to the household characteristics, the percentage of female as head of household was greater among the TPR group compared to the Non-TPR group. A lower percentage of TPR lived in indigenous households and were beneficiaries of social programs compared to Non-TPR group; 71% of TPR were located in first three SES quintiles, while 60% in the Non-TPR group. Around 56 and 46% of women in the TPR group and Non-TPR group lived in metropolitan locality respectively.

Figure 2-Panel A- shows the prevalence of TPR by age categories at first pregnancy of the mother and the prevalence of the two definitions of educational lag by whether TPR occurred or not. As we expected this figure clearly shows a significant reduction of the percentage of cases of teenage pregnancies as the age of first pregnancy of the teenage woman's mother is higher. On the other hand, Panel B of this figure shows that the prevalence of educational lag of one or more years was 59.3% among teenagers with at least one pregnancy and 27% lower for those without a TPR event ($p<0.01$); this difference increased to 54 percentage points (pp.) in educational lag of two or more years.

Table 3 shows the decomposition of the teenage pregnancy effects on educational lag (direct and indirect effects). Teenagers whose mother was pregnant at ages below 16yr. had a higher probability of pregnancy that teenagers whose mother was not pregnant during adolescence (see first column direct effects). Teen pregnancy of the mother was not indirectly related to TPR since mediator variables, socioeconomic status and maximum household educational attained were not significantly related to TPR. On the other hand, TPR of the mother, either at ages before 16yrs or at ages 16 to 19yrs., was found to have an indirect effect on the probability of educational lag mainly through its negative direct effects on SES and maximum household educational attained (see column 2, Table 3). Notably, the observed indirect effect between TPR of the mother and educational lag was practically the same as the effect of TPR on educational lag for teenagers whose mother was pregnant at ages 16 to 19 yrs and tended to be higher among teenagers whose mother was pregnant at ages below 16yrs. That is, the event of TPR of the mother raised the probability of educational lag in practically the same amount as the event of TPR of the daughter (0.39 vs. 0.42 for those whose mother was pregnant at ages 16-19 and 0.54 vs. 0.42 for those whose mother was pregnant at ages below 16yrs., using probit scale). Additionally, receiving benefits from a social program was associated with a lower probability of TPR; it was also related to a lower probability of educational lag through the mediating effect of SES, maximum household educational attained and TPR. Not using contraceptive methods in the first sexual relationship was strongly related to a higher probability of TPR.

The relationship between TPR and educational lag was found to be unidirectional. Teenage pregnancy was directly related to a higher probability of educational lag but educational lag was not related to the probability of TPR, this in turn resulted in no significant indirect effect from

TPR to educational lag. A higher SES and a higher max attained education in household were directly associated to a lower probability of educational lag.

Table 4 shows the estimated effect of TPR (among adolescents aged 15-19yrs.) on the likelihood of educational lag (≥1 or ≥2 yrs.) using a naïve Probit model, PSM and SEM. All methods coincide in the direction of the effect but SEM effects were lower than effects from the other methods. For example, under the event of TPR, the probability of educational lag (as defined by one or more lagged years) was almost 20 pp. higher compared to no TPR event in the naïve probit model, this difference was around 13 to 16 pp. in the propensity score matching models. Using the same base probability as the naïve model (61.2%), SEM total effect of TPR increased the probability of educational lag by about 11 pp. whereas when the same base probability is used to interpret PSM results this effect results in an increase about 8 pp.

5. Discussion.

Adolescents with antecedents of having a pregnancy seem to be in a most vulnerable socioeconomic condition compared to adolescents without antecedents of being pregnant. We also found that familiar antecedents of pregnancy at early ages among mothers of teenage women increases the likelihood of the teenage to be pregnant, this highlights the potential generational transmission of reproductive health decisions among mothers and daughters. This also demonstrates that the lack of women's empowerment to decide on their reproductive health can be passed across generations.

We found evidence of a unidirectional causal effect of teenage pregnancy on educational lag. Teenage pregnancy raised the likelihood of educational lag (≥1 or ≥2 yrs.) among adolescents, which, as we discussed previously, reduces their possibility of increased their years of educations and participate in the labor market in the medium and long terms. This result may represent a step backwards from the achievements of social programs, as Oportunidades, implemented in nearly 15 years that have accomplished increasing levels of education among young women living in poverty and benefited of it.

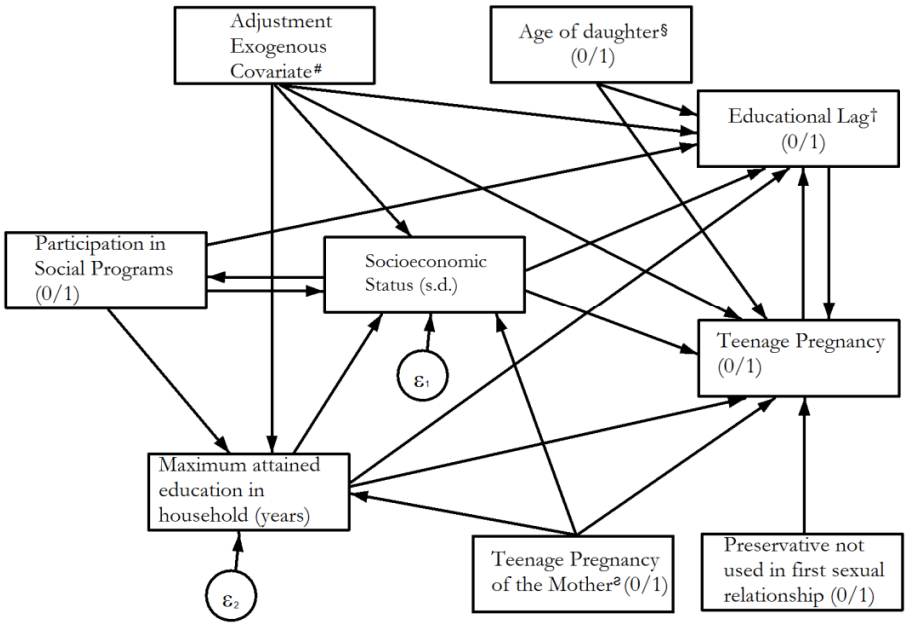
The results shown in this study must be interpreted keeping in mind some limitations. First, despite the fact that the data used has population representativeness and intends to measure indicators of population dynamics in Mexico, it was not designed to explicitly measure teenage history of pregnancy. Second, this study is cross-sectional and observational, so that its capacity to causal inference could have been limited. The third constraint refers to potential losses of teens that refused to answer questions related to their history of pregnancy, which lead to sub-estimations of cases of teenage pregnancies. Additionally, since the occurrence of pregnancy is self-reported directly by the adolescent who agree to answer this survey section, information of this section could be bias. Fourth, the identification of the parental link between mother and daughter within the households was done assuming that the wife of the man, head of the household, or the woman head of the household are mothers of the adolescents. Fifth, the existence of a potential bias due to the non-observation of future events of teenage pregnancy.

Despite these limitations, this is the first study that disentangles the causal relationship between teenage pregnancy and educational lag measuring endogeneity and specifying the direction of this relation. We found that there is an overestimation of the effect of teenage pregnancy on educational lag if endogeneity is not measured. We confirmed that this overestimation is best corrected using proxy variables that indicate early pregnancy across generations and teen's empowerment about deciding to have protected sex at first intercourse, given the fact that these variables determine teenage pregnancy, but not the educational lag. We showed the robustness of results through the use of two different statistical methods, PSM and SEM, that make it possible to reduce the bias resulting from the presence of endogeneity.

Social policies with a clear gender perspective could have a significant impact on how sexual norms and reproductive practices are shaped, contributing no only to women's empowerment over their reproductive health decision, but also increasing women's capital accumulation (with better education perspective and greater possibilities to be included in the labor market). According to the results of this article, the lack of empowerment of young women about their reproductive health, can lead to the backwardness in the accumulation of capital that could be replicated across generations of women. Access to sex education among young women could contribute to better social and economic opportunities for women at risk of early pregnancy.

Figure 1

Structural equation model (SEM) for the replication of the teenage pregnancy and educational lag consequences



#Adjustment exogenous covariates included a non-nuclear household indicator (0/1), sex of household head (0=female/1=male), a working condition indicator for the household head (0=not working/1=working), age of household head (years), size of household (adult-equivalent units), type of social security. §Age was specified using indicator variables at each year of age and using the fifteen year age as reference category. †Education lag defined as two or more years of age above the expected age when no lag is present. ¤Two indicator variables were included, one for teenage pregnancy of the mother at ages below 16y and another for teenage pregnancy of the mother at ages 16 to 19y.

Table 1

Pregnancy and educational lag among women aged 12-19

Age (yrs.)	Observations		Teenager pregnancy % [SE]	Educational lag			
				≥1 yr.		≥2 yrs.	
	Sample	Weighted		% [SE]	Mean [SE]	% [SE]	Mean [SE]
12	2,497	791,404	0.02 [0.02]	57.7 [1.60]	1.33 [0.03]	12.0 [1.06]	2.57 [0.07]
13	2,677	831,028	Ncr	58.2 [1.46]	1.42 [0.03]	13.2 [1.05]	2.84 [0.10]
14	2,805	876,864	0.38 [0.14]	58.3 [1.40]	1.57 [0.05]	17.2 [1.21]	2.94 [0.12]
12-14	7,979	2,499,296	0.14 [0.05]	58.1 [0.89]	1.44 [0.02]	14.2 [0.70]	2.81 [0.06]
15	2,475	757,351	0.98 [0.49]	63.7 [1.35]	1.56 [0.04]	17.4 [1.11]	3.06 [0.08]
16	2,312	723,238	1.54 [0.63]	60.7 [1.64]	1.73 [0.05]	19.3 [1.25]	3.31 [0.11]
17	2,260	677,984	3.82 [0.61]	65.1 [1.45]	2.12 [0.07]	35.4 [1.44]	3.05 [0.09]
18	1,908	604,725	8.08 [1.02]	68.3 [1.69]	2.60 [0.09]	41.3 [1.73]	3.64 [0.12]
19	1,679	517,364	10.5 [1.01]	45.2 [1.79]	2.97 [0.09]	33.1 [1.56]	3.69 [0.09]
15-19	10,634	3,280,662	4.49 [0.33]	61.2 [0.75]	2.10 [0.03]	28.4 [0.69]	3.37 [0.05]
12-19	18,613	5,779,958	2.61 [0.19]	59.9 [0.60]	1.82 [0.02]	22.3 [0.53]	3.21 [0.04]

Note: Weighted and survey design estimations. ncr: no cases reported.

Table 2

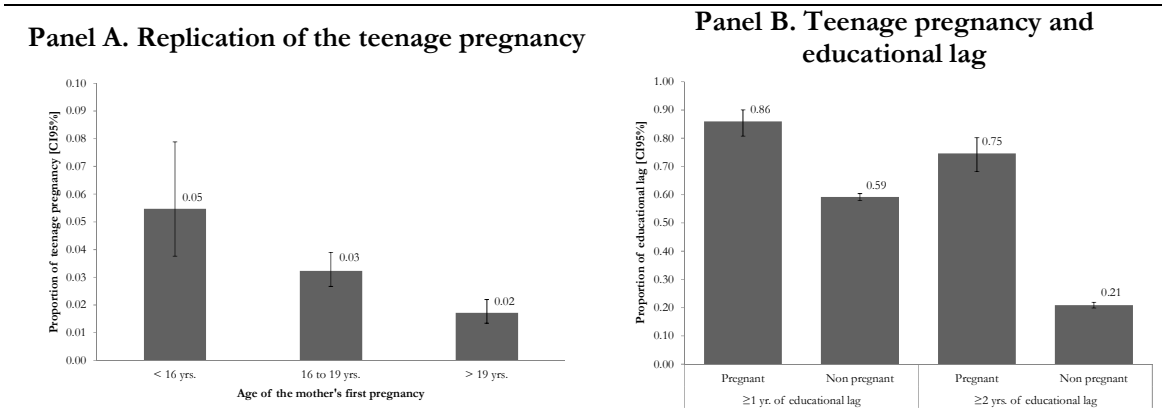
Sociodemographic profile of pregnant and non-pregnant teenagers

	Teenager pregnancy	Non-teenager pregnancy	Difference test
Observations			
Sample	**475**	**18,138**	
Weighted	**150,930**	**5,629,028**	**(p-value)**
%	**2.68**	**97.3**	
	Mean, proportion [SE]		
Individuals			
Age (in yrs.)	17.8 [0.11]	15.1 [0.03]	<0.01
Preservative not used in first sexual relationship	0.78 [0.03]	0.03 [0.00]	<0.01
Birthplace: Same State of residence	0.91 [0.02]	0.92 [0.00]	0.50
Health insurance			
Social security	0.24 [0.03]	0.40 [0.01]	<0.01
Seguro Popular	0.30 [0.03]	0.22 [0.01]	0.02
Without health insurance	0.47 [0.04]	0.37 [0.01]	0.02
Household			
Head			
Male	0.64 [0.04]	0.80 [0.01]	<0.01
Age (yrs.)	44.6 [0.57]	43.9 [0.11]	0.26
Working	0.88 [0.02]	0.89 [0.00]	0.71
Max attained education (yrs.)	10.6 [0.19]	11.3 [0.05]	<0.01
Number of equivalent adults	4.53 [0.15]	3.78 [0.02]	<0.01
Type: Nuclear vs. extended	0.09 [0.03]	0.83 [0.01]	<0.01
Indigenous	0.06 [0.01]	0.10 [0.01]	0.02
Receives cash/non-cash transfers from a social programs	0.24 [0.02]	0.31 [0.01]	0.01
SES index, s.d.	-0.14 [0.04]	-0.08 [0.02]	0.30
Locality of residence			
Rural	0.16 [0.01]	0.25 [0.01]	<0.01
Urban	0.28 [0.02]	0.29 [0.01]	0.75
Metropolitan	0.56 [0.02]	0.46 [0.01]	<0.01

Note: Weighted and survey design estimations.

Figure 2

Intergenerational transmission of teenage pregnancy between mothers and daughters and educational lag consequences



Note: Weighted and survey design estimations.

Table 3

Direct and indirect teenage pregnancy effects on educational lag

	Direct effects		Indirect effects		Total effects	
	Effect	**SE**	**Effect**	**SE**	**Effect**	**SE**
Educational lag[§#] ←						
Teenage pregnancy	0.41**	[0.06]	0.01	[0.01]	0.42**	[0.06]
Socioeconomic status, s.d.	-0.12**	[0.03]	0.16**	[0.03]	0.04	[0.03]
Max attained education in household	-0.29**	[0.02]	-0.01	[0.01]	-0.30**	[0.01]
Participates in social program	-0.13	[0.08]	-0.49**	[0.07]	-0.62**	[0.07]
Preservative not used in first sexual relationship	----		0.99**	[0.14]	0.99**	[0.14]
Teenage pregnancy of mother at ages before 16 yrs.	----		0.54**	[0.09]	0.54**	[0.09]
Teenage pregnancy of mother at ages 16 to 19 yrs.	----		0.39**	[0.05]	0.39**	[0.05]
Threshold	1.66**	[0.13]	----		----	
Teenage pregnancy[§#]←						
Educational lag	0.06	[0.09]	0.00	[0.01]	0.07	[0.09]
SES index, s.d.	0.03	[0.05]	0.05	[0.03]	0.08*	[0.04]
Max attained education in household	-0.03	[0.04]	0.00	[0.03]	-0.03	[0.02]
Participates in social program	-0.28*	[0.13]	0.03	[0.04]	-0.24	[0.13]
Preservative not used in first sexual relationship	2.34**	[0.11]	0.06	[0.09]	2.40**	[0.16]
Teenage pregnancy of mother at ages before 16yrs.	0.40*	[0.16]	0.03	[0.03]	0.42**	[0.16]
Teenage pregnancy of mother at ages 16 to 19 yrs.	0.09	[0.10]	0.03	[0.02]	0.12	[0.10]
Threshold	4.14**	[0.48]	----		----	
Socioeconomic status, s.d.[#]←						
Teenage pregnancy of mother at ages before 16 yrs.	-0.27**	[0.09]	-0.17**	[0.05]	-0.44**	[0.07]
Teenage pregnancy of mother at ages 16 to 19 yrs.	-0.10*	[0.05]	-0.20**	[0.03]	-0.29**	[0.04]
Max attained education in household	0.26**	[0.01]	-0.07**	[0.01]	0.19**	[0.01]
Participates in social program	1.10**	[0.10]	-0.02	[0.05]	1.07**	[0.06]
Constant	-2.17**	[0.12]	----		----	
Max attained education of household members[#] ←						
Teenage pregnancy of mother at ages before 16 yrs.	-1.29**	[0.22]	0.15**	[0.04]	-1.14**	[0.21]
Teenage pregnancy of mother at ages 16 to 19 yrs.	-1.18**	[0.11]	0.10**	[0.02]	-1.08**	[0.10]
Participates in social program	-0.08	[0.13]	-0.36**	[0.09]	1.03**	[0.11]
Constant	-2.81**	[0.25]	----		----	
Participates in a Social Program ←						
SES index, s.d.	-0.24**	[0.02]	0.06**	[0.01]	-0.18**	[0.01]
Constant	0.37**	[0.03]	----		----	

[§]Adjusted for teen age using indicator variables at each year of age and setting age fifteen as reference category.[#] Adjusted for type of household (0=nuclear/1=non-nuclear), sex of household head(0=female/1=male), labor condition of household head (0=not working/1=working), age of household head (years), size of household (adult-equivalent units), type of social security. **p<0.05; **p<0.01.*

Table 4

Effect of teenage pregnancy on educational lag among women aged 15-19♀

	Naïve model	Matching‡			SEM§	
		Nearest neighborhood	Kernel	Radius		
PANEL A: Educational lag ≥1 yr.						
% educational lag	61.2	78.3			61.2	78.3
Effect (on Percentage points) [SE]	19.7**	13.8**	15.8**	13.3*	11.1**	7.9**
	[3.54]	[3.97]	[4.78]	[5.21]	[1.6]	[1.0]
PANEL A: Educational lag ≥2 yrs.						
% educational lag	28.4	63.6			28.4	63.6
Effect (on Percentage points) [SE]	26.6**	16.7**	23.9**	20.7**	15.8**	14.4**
	[5.75]	[4.64]	[4.42]	[4.79]	[2.2]	[1.7]

Note: ♀Comparison group: zero years of educational lag. ‡Matching includes a caliper=0.01, teenagers were matching by all variables shown in Table 2.§Base probability was taken with certainty for comparative purposes with the other methods; standard errors were approximated assuming symmetric confidence intervals at the predicted probabilities.* *p<0.05.*** *p<0.01.*

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