Education, Earnings and Health Effects of Teenage Pregnancy in the Philippines

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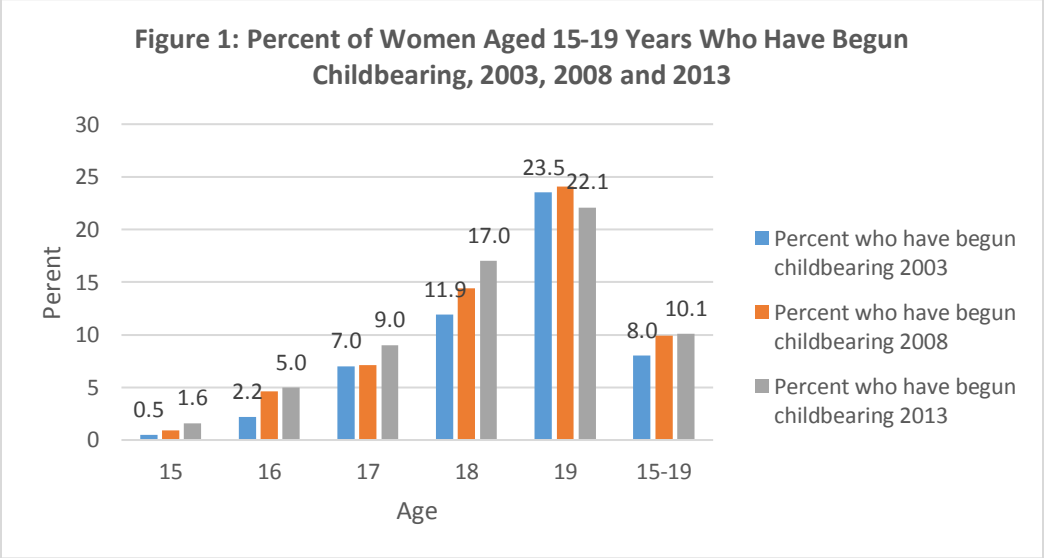
1. Introduction

This paper examines the effect of teenage pregnancy (early childbearing) on education and lifetime earnings using data from national surveys. It also presents available published data on selected health outcomes associated with early childbearing.

Data from the National Demographic and Health Survey (NDHS) 2013 on the women aged 15-19 who have begun childbearing, that is women who have had a live birth or are pregnant at time of interview, are shown in Figure 1. Early childbearing has increased in the last 10 years (2003 to 2010). Between 2003 and 2013, early childbearing among women aged 15-19 years rose from 8 percent to 10 percent.



Source: Philippines, National Demographic and Health Survey (NDHS) 2013

2. Early Childbearing, Education and Lifetime Earnings

General framework

A general approach for analyzing the effect of early childbearing on lifetime earnings is to first examine the effect of early childbearing on education, and then using an earnings function where wage rates are determined by education, experience (proxied by age) and other factors representing labor market conditions, estimate the effect of lower education on earnings resulting from early childbearing (Chaaban and Cunningham, 2011). This general framework is depicted in Figure 2.

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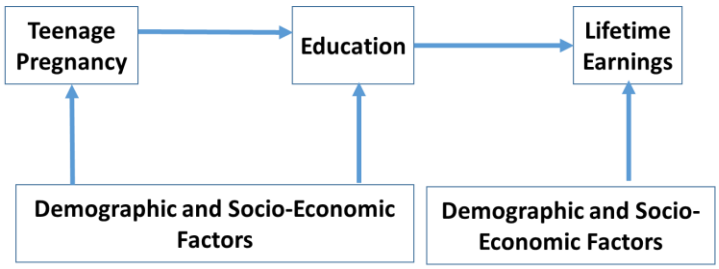
Figure 2: General Framework for Conceptualizing the Effect of Teenage Pregnancy on Education and Lifetime Earnings



Reviews of past studies point to the fact that the negative effect of teenage pregnancy on educational outcomes might be overstated if it does not account for the fact that schooling completion may not be due to the effect of teenage pregnancy but due to the effect of other factors such as family background (Bisset, 2000). Various approaches have been tried to account for background factors in determining the effect of teenage pregnancy. One approach is the use of sisters, one with teenage pregnancy and the others without). The assumption is that the sisters would have the same set of background factors and the difference in schooling outcome can be attributed to teenage pregnancy (Hoffman, Foster, and Furstenberg, Jr. 1993; Geronimus and Korenman, 1992; Ribar, 1999). Another use a propensity-score-matching to match teen mothers to similar teens prior to pregnancy, and thereby control for background factors. To account for possible endogeneity of the teenage pregnancy variable, an instrumental variable approach is used. (Klepinger, Lundberg and Plotnick, 1997), while others allow teenage pregnancy and schooling to be jointly determined, in which case teenage pregnancy is endogenous to the model (e.g., Ribar). In this study, we shall take account of this issues is estimation.

Data sources

Data available for this study are the National Demographic and Health Survey (NDHS) 2013, and the Labor Force Survey-Family Income and Expenditure Survey (LFS-FIES) 2012. The NDHS data is used for estimating the relationships between teenage pregnancy and education, and demographic and socio-economic factors. The LFS-FIES data, on the other hand, is used for estimating the effect of education on wage rates, taking into account demographic and socio-economic factors and participation of women in work for pay

Estimating the effect of early childbearing among women 18-19 years old on high school completion rates

The general framework shown in Figure 2 is translated into an empirical model for estimation graphically depicted in Figure 3. The variables are defined as follows:

- Teenage pregnancy is measured by women aged 18-19 years who have begun childbearing, i.e., had a birth before age 18 years. We restrict our sample to women aged 18-19 years to ensure that the background characteristics that these women are exposed to at time of survey is more or less the same as when they had their first birth, i.e., during the last five years. Including older women, while this will increase our sample size, will compromise the effect of available background variables that may not hold true when these older women had their first birth. Moreover, we restrict early childbearing to these group of women 18-19 years old to births

before 18 years at the time when they would be in high school. Women aged 18-19 years could have births at age 18 and 19, but then it is likely at that age that they would have completed high school if they pursued it and not drop out for whatever reason. For this reason, we would not expect that completing high school or not would affect early childbearing. Hence, we will be concerned only with estimating the effect of early childbearing before age 18 on high school completion at age 18-19.

- Education is measured by completion of high school by women age 18-19 years at time of survey. We assume that women would have completed high school by aged 18-19 years if they did not interrupt schooling (expected average completion age would be 17 years) or even when they did interrupt schooling due to childbearing or other reasons, that they had a chance to continue on and complete high school by age 18-19 years, if there were no constraints.

- Background variables for both early childbearing and high school completion are urban-rural residence, regions (NCR, Luzon, Visayas and Mindanao), and wealth index (quintile) estimated by the NDHS based on household assets. In addition, for early childbearing, we include age at menarche as an instrument that determine early childbearing but not high school completion.

- We estimate the model using bivariate probit to take account of unobserved factors that affect early childbearing and unobserved factors that affect high school completion rate. The mean and standard error of the variables are shown in Table 1.

Figure 3: Empirical model: Early Childbearing and High School Completion

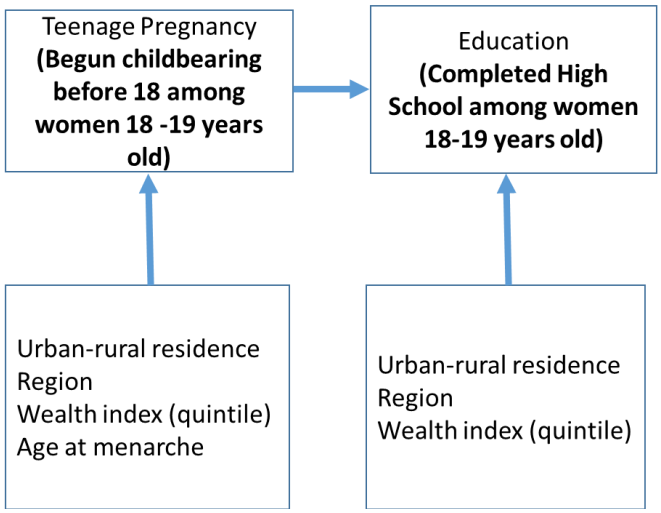


Table 1: Mean and Standard Errors of Variables

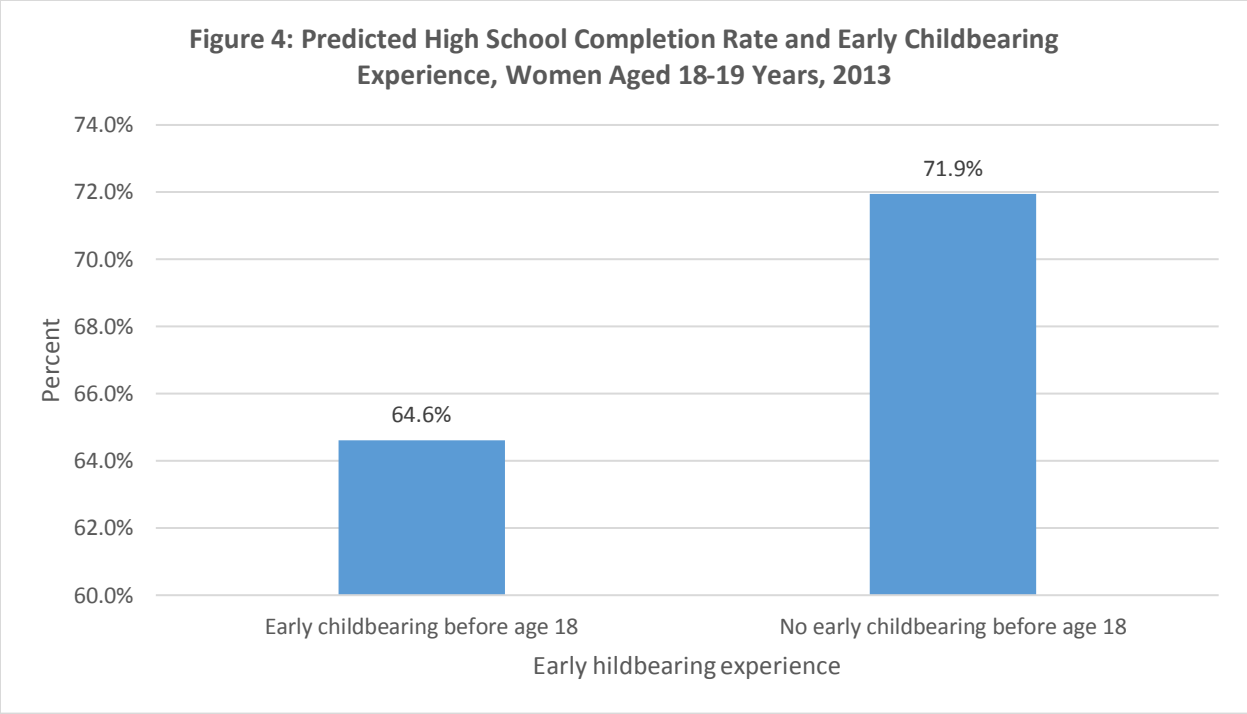
Variables	Weighted Mean	Std. Error
Completed high school	0.752	0.013
Experienced early childbearing before age 18	0.078	0.008
Urban	0.570	0.015
NCR	0.194	0.013
Luzon	0.401	0.015
Visayas	0.145	0.011
Mindanao	0.260	0.012
Lowest wealth index	0.143	0.010
Second wealth index	0.180	0.011
Middle wealth index	0.223	0.013
Fourth wealth index	0.190	0.012
Highest wealth index	0.265	0.014
Age at menarche	12.906	0.043

The results in Table 2 show that early childbearing before age 18 years, all other factors being equal, reduces the probability of high school completion by -.571 percentage points (confidence interval from -.411 to -.732 and significant of 1 percent level). As for the other variables, the effect of urban-rural residence on high school completion rates is not significant. Relative to residence in the National Capital Region (NCR) (reference variable omitted in the regression), residence in CALABARZON and Western Visayas increases the probability of high school completion each by 9 and 13 percentage points, respectively. The effect of wealth is highly significant (below 1 percent). Relative to the lowest quintile (reference variable omitted in the regression), the probability of high school completion is increased by 0.25 percentage points among those in the second quintile, 0.36 percentage points among those in the third quintile, and 0.41 percentage points among those in the fourth and highest quintiles.

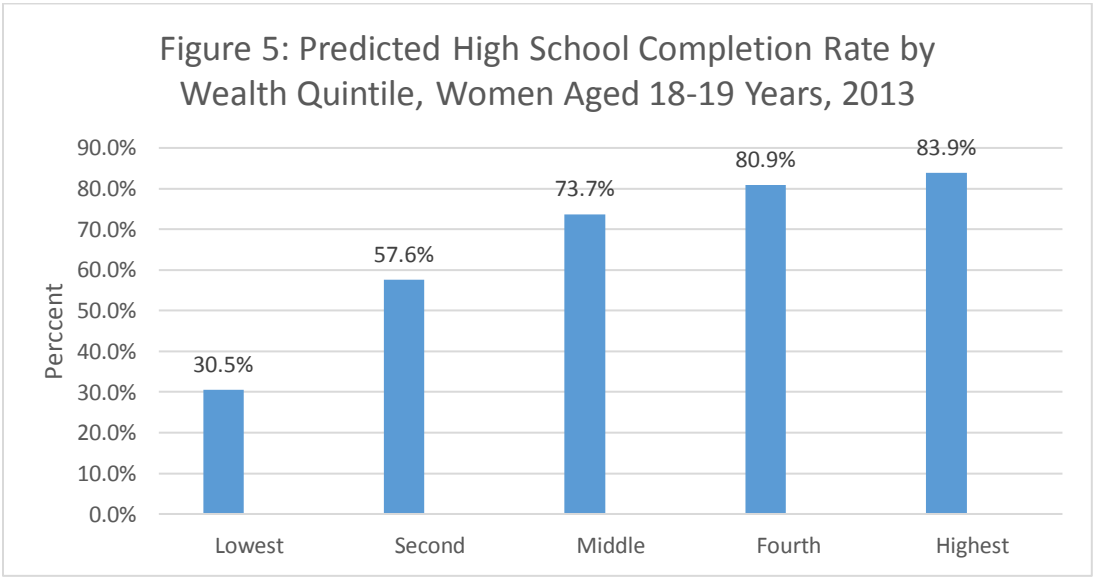
Table 2: Marginal Effects of Early Childbearing on High School Completion

Variables	Marginal effect (dy/dx)	P |z|
Begun childbearing before age 18	-0.571	0.000
Urban	-0.047	0.078
Region (Reference = NCR)		
Cordillera Administrative Region	0.061	0.401
I - Ilocos Region	0.564	0.315
II - Cagayan Valley	0.016	0.785
III - Central Luzon	0.074	0.109
IVA - CALABARZON	0.088	0.048
IVB - MIMAROPA	-0.023	0.480
V - Bicol	-0.023	0.739
VI - Western Visayas	0.010	0.870
VII - Central Visayas	0.130	0.004
VIII - Eastern Visayas	0.022	0.663
IX - Zamboanga Peninsula	-0.017	0.825
X - Northern Mindanao	0.052	0.297
XI - Davao	0.026	0.645
XII - SOCCSKSARGEN	0.026	0.622
XIII - Caraga	0.006	0.915
ARMM	0.004	0.950
Wealth index (Reference=Lowest)		
Second	0.251	0.001
Third	0.361	0.000
Fourth	0.413	0.000
Highest	0.410	0.000

For ease of interpretation of the statistical results on the effect of early childbearing before age 18 on high school completion, we computed the predicted average probabilities of high school completion rates by whether women aged 18-19 years experienced early childbearing and whether they did not, while setting the value of all the other variables equal to their mean values. The results are shown in Figure 4. On average, among women aged 18-19 years, 72 percent are expected to complete high school if women did not begin childbearing before age 18 years, while 65% are expected to complete high school among those who began childbearing early.



Wealth is a key factor affecting high school completion rate. On average, children of richer higher quintiles) households are expected to complete high school more than children in poorer (lower quintile) households. As shown in Figure 5, the predicted completion rate among those who did not experience early childbearing rises from 31 percent among the poorest households (lowest quintile) to the 84 percent among the richest households (highest quintile).

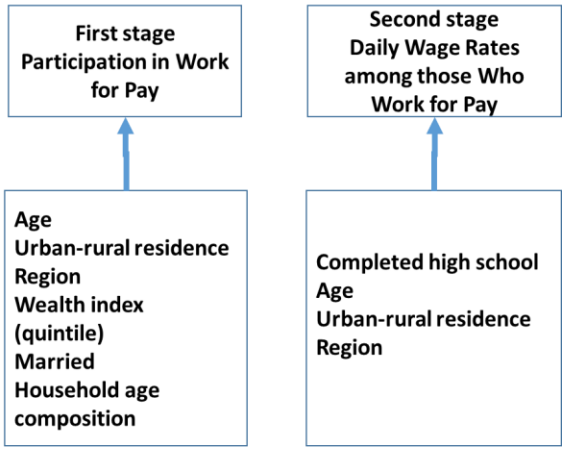


Estimating the effect of high school completion on lifetime earnings

The standard approach to estimate the effect of education on earnings (wage rate) is to estimate the earnings function as suggested by Mincer (1974). In this model, wage rates are determined by level of education (representing the stock of human capital embodying knowledge and skills) and labor market experience proxied by age. It is hypothesized that education increases wage rates and that experience also increase wage rates but at a decreasing rate.

A problem occurs in estimating wage rates when not all are working for pay. This is especially in the case for women. If the estimate is based only on those who worked for pay, the effect of education may be biased because the estimation does not take into account that those who do not work for pay may have characteristics different from those who do work, other than education. In other words, the sample on which we estimate the wage rates that includes only women who worked for pay is not a randomly selected group of women. A standard approach to addressing this problem is to apply a two-stage analysis suggested by Heckman (1979). Our model using this approach is graphically depicted in Figure 6.

Figure 6: Empirical framework for estimating the effect of high school completion on female wage rates

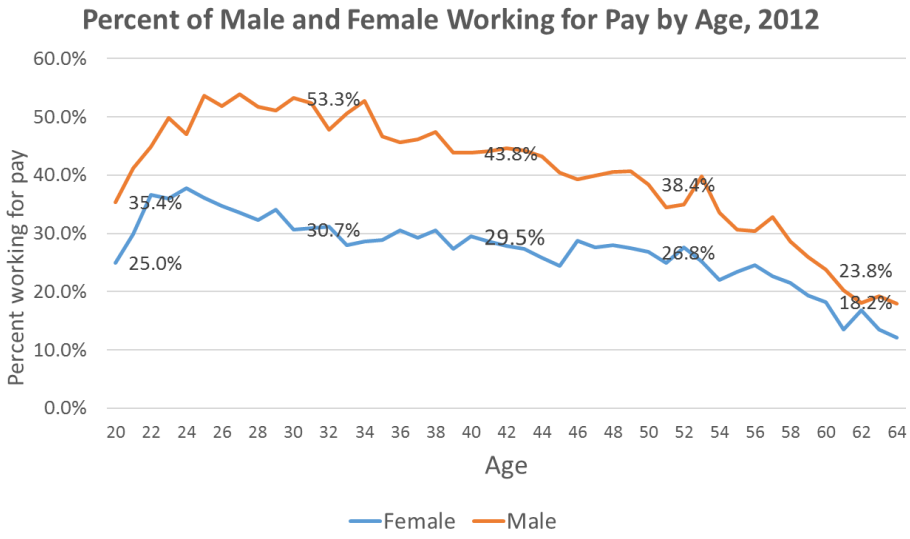


In this model, we first estimate the participation of women in work for pay (women also work as unpaid family labor, hence the complement of work for pay is not working or working as unpaid family labor) as determined by such factors as age, urban-rural residence, region of residence, marital status and age composition of the households. Typical hypotheses are: age increases participation in work for pay but at a declining rate; urban-rural residence and region reflect labor market conditions and have different effects; marriage reduces participation in work for pay as mothers spend time at home to care for children; and in household composition, the presence of young children may reduce participation in work for pay, but the presence of older members increases participation since some adults are now available to take care of children.

In the second stage, we estimate the wage rate as determined by high school education and age (and its squared value to reflect possible declining effect of experience on wage rates). In addition, we control for labor market conditions reflected in urban-rural and regions. The sample used is all women aged 15

years and older in the LFS-FIES data set. The Stata program on Heckman Selection Model automatically provides the estimates from these two stages. The female participation rates in work for pay by age based on the LFS-FIES 2012 are shown in Figure 7.

Figure 7: Participation Rates in Work for Pay by Single Age, 2012



Source of basic data: LFS-FIES 2012

The results are shown in Table 2. The results show that completing high school education increases daily wage rates of women by PhP 300. Women in urban areas and in NCR received higher daily wage rates than in rural and outside the NCR, reflecting market conditions and differences in minimum wage rates.

Table 2: Effect of High School Education on Female Wage Rates: Heckman Selection Model

Variables	FIRST STAGE: Participation in work for pay		SECOND STAGE: Daily wage rate	
	Marginal effect (dy/dx)	P-value	Coefficient	P-value
Age of woman	0.001	0.000	14.6	0.000
Squared term of age of woman			-0.1	0.000
Completed high school	0.099	0.000	300.8	0.000
Married	-0.045	0.000		
Urban	0.038	0.000	41.7	0.001
Region (default: NCR)				
I - Ilocos Region	-0.081	0.000	-118.6	0.000
II - Cagayan Valley	-0.016	0.162	-91.9	0.000
III - Central Luzon	-0.034	0.000	-84.0	0.000
IVA - CALABARZON	-0.016	0.051	-21.6	0.542
IVB - MIMAROPA	-0.078	0.000	-65.4	0.001
V - Bicol Region	-0.072	0.000	-68.9	0.000
VI - Western Visayas	-0.027	0.005	-113.9	0.000
VII - Central Visayas	-0.006	0.517	-93.0	0.000
VIII - Eastern Visayas	-0.068	0.000	-56.8	0.006
IX - Zamboanga Peninsula	-0.087	0.000	-102.6	0.000
X - Northern Mindanao	-0.042	0.000	-95.7	0.000
XI - Davao Region	-0.074	0.000	-109.6	0.000
XII - SOCCSKSARGEN	-0.078	0.000	-103.3	0.000
CAR	-0.067	0.000	-30.6	0.221
ARMM	-0.219	0.000	-43.0	0.110
Caraga	-0.073	0.000	-54.7	0.006
Household composition				
Number of household members age 0 to 5	-0.022	0.000		
Number of household members age 6 to 19	-0.010	0.000		
Number of household members age 20 and above	0.009	0.000		

Estimating lifetime earnings of the cohort of women 18-19 years old and the effect of early childbearing through its effect of high school completion

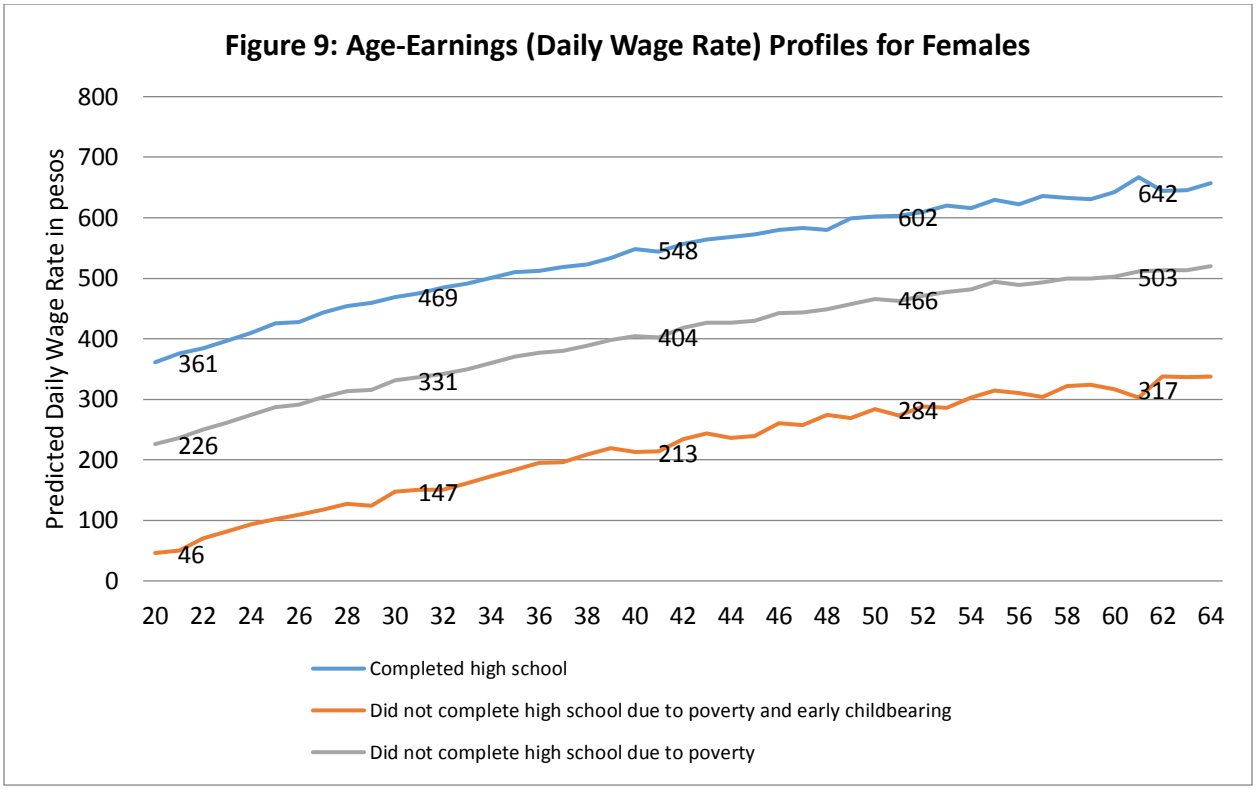
Using the results of Stage Two in Table 2, we estimate the daily wage rates per woman by single age of woman age 15 to 64, first when the woman has completed high school, and second when the woman has not completed high school. Note that from our earlier results, not completing high school is due to the combined effect of early childbearing and wealth status (quintile). The results in terms of predicted daily wage rates are provided from the application of the Heckman Selection Model using the Stata

program. To estimate the reduction in daily wage rate by age from not completing high school due to early childbearing, we compute as depicted in Figure 8.

Figure 8: Estimating the reduction in daily wage rate from not completing high school due to early childbearing

Predicted daily wage rate by age, completed high school (A)	Predicted daily wage rate by age, not completing high school due to early childbearing and wealth (B)	Predicted daily wage rate by age, not completing high school due to wealth (C)	Predicted reduction in daily wage rate by age, not completing high school due to early childbearing (D)
A and B are computed directly from the Stata program applying the Heckman Selection Model. C = B + ((A – B) * (Marginal effect of early childbearing on high school completion shown in Table 2, which is equal to -.556) D = (C – B)			

The result age-earnings (daily wage rate) profiles under three situations: complete high school, did not complete high school due to poverty (wealth status) and early childbearing, and did not complete high school due to poverty (wealth status) are shown in Figure 9.



We now compute for the total lifetime earnings foregone as a result of early childbearing of the cohort of women aged 18-19 years from age 20 to 64 years. To do this we take the predicted reduction in daily wage rate per woman by age (depicted in Box D in Figure 8). We then multiply this to (1) the mean percent of women 18-19 years not completing high school from the sample, equal to 25%; (2) the percent of women working for pay by age from the LFS-FIES 2012 data; and (3) the estimated number of women by age from the national census. The result would be the estimated foregone daily wage rate by age due to early childbearing. The estimation is depicted in Figure 9.

Further, we multiply the daily wage foregone by 264 days to get annual wages by age and apply discount rates of 5% and 3% to get the present value of annual earnings foregone by age. We then sum this from age 20 to 64 years to get present value of total lifetime earnings foregone. The mean value of foregone earnings at 5% discount rate is 33 billion pesos representing 1.1 percent of Gross Domestic Product (GDP) in 2012, ranging from 24 billion pesos to 42 billion pesos or 0.8% to 1.4% of GDP based on the confidence interval of the estimated effect of early childbearing on high school completion rate.

Figure 9: Estimating lifetime foregone earnings due to early childbearing

Predicted reduction in daily wage rate by age as a result of early childbearing (A)	Percent of women aged 18-19 years not completing high school in the sample (= 25% across all ages) (B)	Per cent of women working for pay by age from LFS-FIES 2012 (C)	Estimated number of women by age from the census (Census 2010) (D)	Estimated foregone daily wage rates by age due to early childbearing (E)
Earnings foregone due to early childbearing Foregone daily wage rates by age : E = A * B * C * D Discounted foregone annual earnings by age: DE = (E * 264 days)/$(1 + 5\%)^t$, where 5% is the discount rate and t is the year; alternative discount rate is 3% Total discounted lifetime annual earnings foregone from age 20 to 64: TDE= ΣDE, sum of DE from age 20-64				

Summary

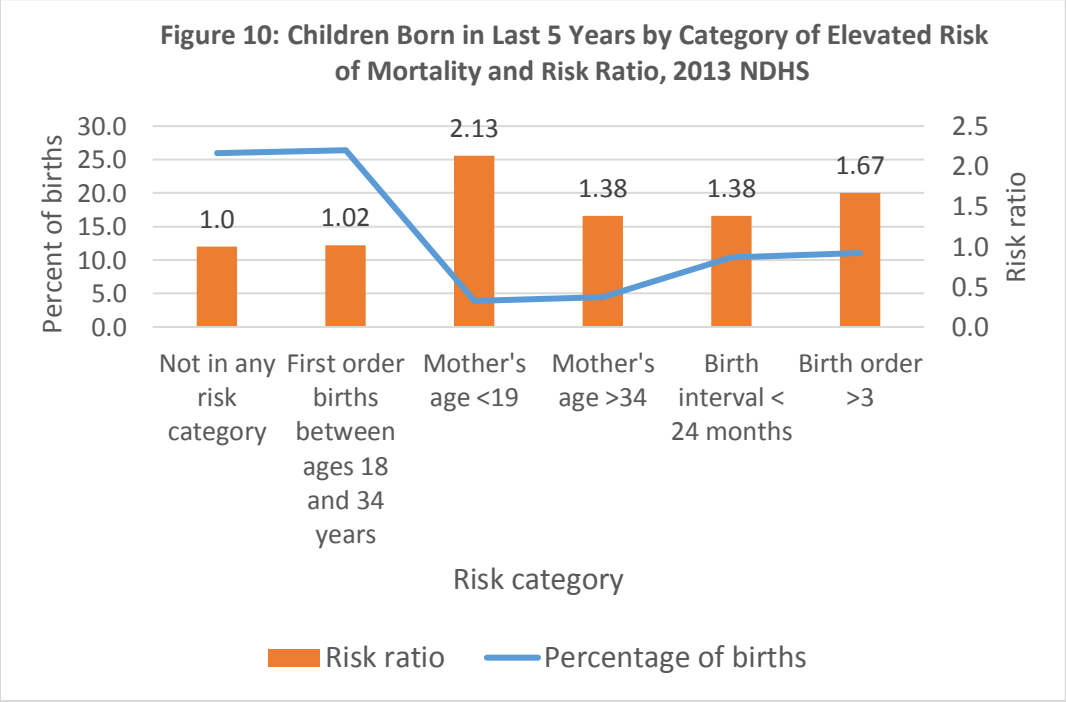
In summary, the analysis shows the following results. With respect to the relationship between early childbearing and education, the results are (1) early childbearing reduces probability of completing high school; and (2) teenage women from richer households (measured by wealth quintiles) have higher probability of completing high school than teens in poorer households.

With respect to the relationships among education, wage rates and lifetime foregone earnings, the results are (1) the age-earnings (wage rate) profile is higher among those who completed high school compared to those who did not; (2) early childbearing reduces age-earnings (wage rate) profile through its effect on high school completion; and (3) the discounted lifetime wage earnings foregone by a cohort of teenage women 18-19 years resulting from early childbearing is estimated between 24 billion pesos and 42 billion pesos with mean of 33 billion pesos, representing from 0.8% to 1.4% of GDP with mean of 1.1%.
In terms of policy implications, the results suggest that policies that reduce early childbearing are likely to have substantial impact on the education and economic conditions of women and their families as well as on society as a whole.

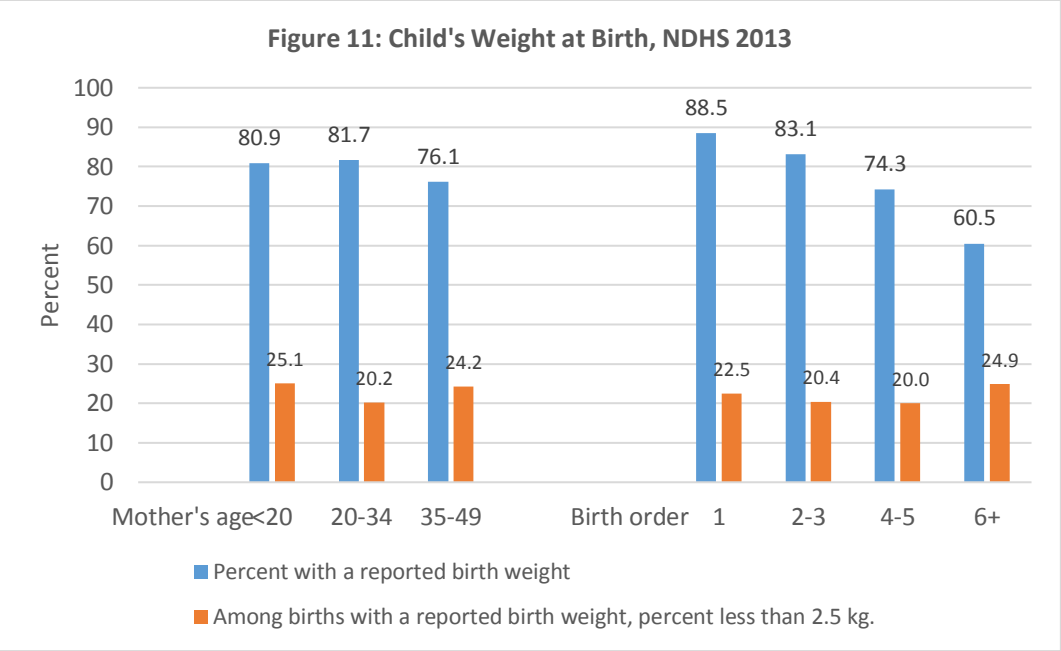
3. Health Effects of Early Childbearing

Data from the National Demographic and Health Survey (NDHS) 2013 provide information on the association between early childbearing and some health outcomes, in particular child mortality and low birth weight and preterm babies. Births by women below 19 years have two times the risk of dying before age 5 years compared to women not in any risk category (i.e., age 20-34 years, more than two years' birth interval and not more than three children ever born) (Figure 10).

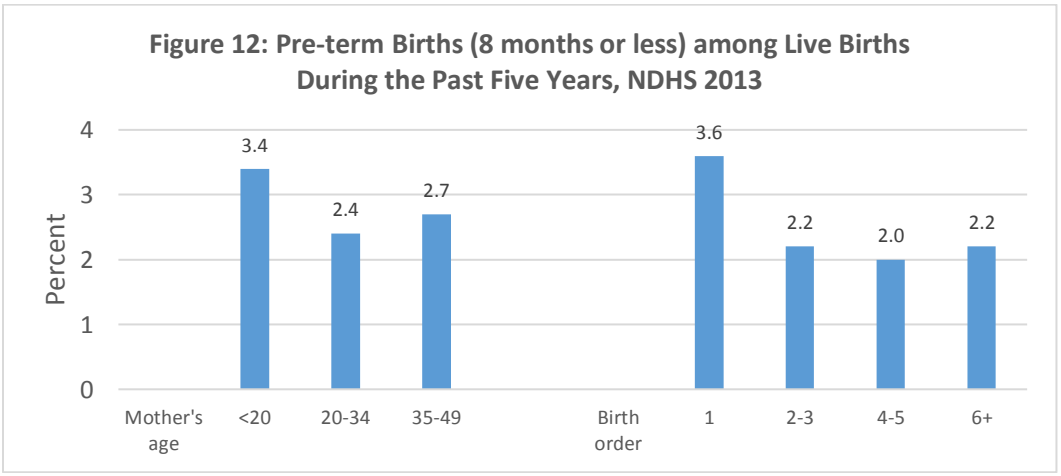
Births to mothers age less than 20 years have a higher percentage of low birth weight babies compared to women 20-34 (Figure 11) and higher percentage (3.4 percent) of preterm babies compared to births at older ages (Figure 12). Both low birth weight and preterm babies are risk factors for child stunting. Higher percentage of young women ages 15-19 report having problems accessing care when they are sick, which might include conditions related to pregnancy and childbirth (Figure 13). In addition, data from the National Nutrition Survey (NNS) 2013 show high prevalence of nutritionally-at-risk pregnant women below 20 years of age compared to other age groups (Figure 14).



Source: Philippines National Demographic and Health Survey (NDHS) 2013



Source: Philippines National Demographic and Health Survey (NDHS) 2013



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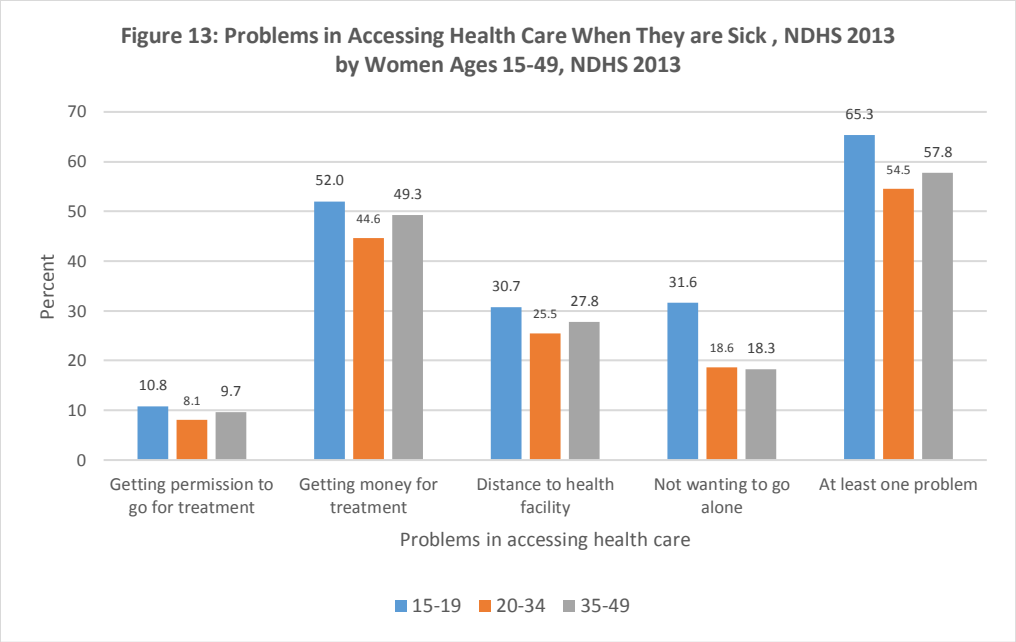

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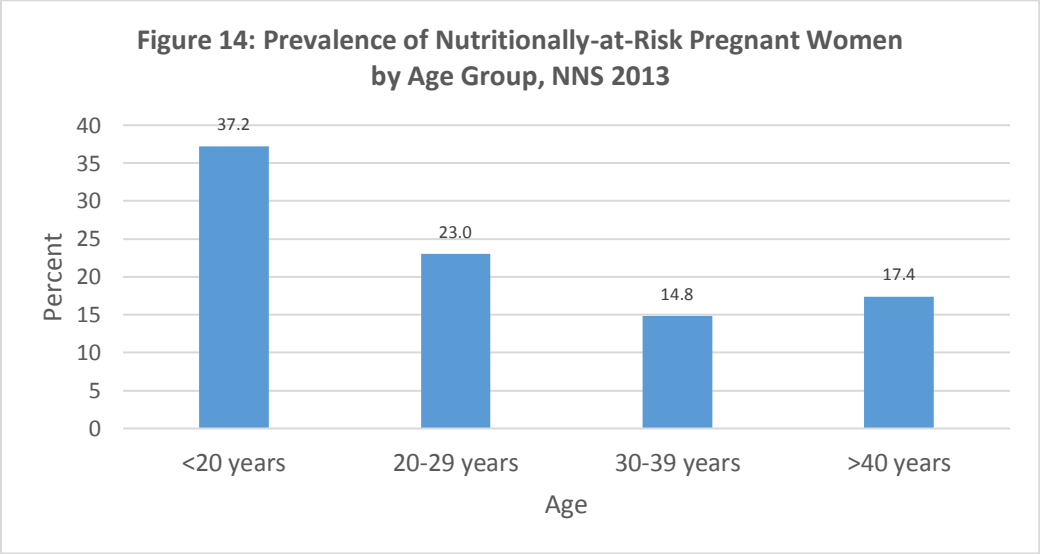

Source: Food and Nutrition Research Institute (FNRI), National Nutrition Survey (NNS), 2013

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