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RESEARCH ARTICLE

Investigating the Impact of a Conditional Cash Transfer on Adolescent Pregnancy: Incidence and Health Outcomes

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The literature on conditional cash transfers focuses on the impact of such on health and education outcomes. The Pantawid Pamilyang Pilipino Program in the Philippines provides a cash grant conditional on requirements related to health and education. We investigated the impact of the program on adolescent pregnancy through its link to education. The program, which is designed to increase teen education, may lead to decreased adolescent pregnancy because it adds to the opportunity cost of getting pregnant. Though the incidence of pregnancy among adolescent women rates in the Philippines have declined over the past thirty years, a considerable number of young women still experience their first birth between 15 and 19. The 2017 National Demographic Health Survey in the Philippines revealed that almost 10% of women aged 15-19 had begun childbearing, the highest rate in Southeast Asia. We used using the National Demographic Health Survey for 2013 and 2017 to explore the impact of the Pantawid Pamilyang Pilipino Program on adolescent pregnancy Results from the difference-in-difference method and coarsened exact matching revealed that, although rates of adolescent pregnancy declined from 2013 to 2017, and health-related factors such as infant birth weight, infant survival rate, and maternal health improved, these outcomes were not directly attributable to the Pantawid Pamilyang Pilipino Program. We explore possible policy recommendations related to adolescent pregnancy and poverty programs.

Key Words: conditional cash transfer, adolescent pregnancy, coarsened matching, difference-in-difference

JEL Codes: D19,J1, J19, I1, I10

The Pantawid Pamilyang Pilipino Program (hereafter, 4Ps) is a human-development program in the Philippines. Implemented in 2007, the program has so far covered 20,000,000 Filipinos. The program's objective is two-fold: first, to provide social assistance in the form of cash grants and second, to enhance living conditions, thereby affecting health and education. One interesting area of research is the educational aspect of the conditional-cash-transfer program. This paper thus focused on whether the program has an impact

on reducing teenage pregnancy through the education link. In order to answer the research question, the paper used the difference-in-difference method and coarsened exact matching using the data from the National Demographic Health Survey in 2013 and 2017.

Our work is motivated by the increasing trend in teenage pregnancy in the Philippines, especially in rural areas. Several years before the 4Ps Program was implemented, the incidence of teenage pregnancy among women aged 15-19 was higher in rural areas. According to the Annual Poverty Indicators Survey, 13.8% of young women left school in 2016 compared to only 5.9% of young men. The three main reasons identified in the survey were lack of personal interest, insufficient family income, and marriage and family matters.

Given the rates of teenage pregnancy in the country, we investigated whether the 4Ps Program had an impact on reducing adolescent pregnancy and on health outcomes for adolescent mothers and their children.

Adolescent Pregnancy and Its Determinants: The Importance of Education and Health Outcomes

Factors such as family background, educational attainment of parents, and income can influence the incidence of adolescent pregnancy. Evidence from several countries has shown that income and educational level are negatively correlated with adolescent pregnancy. Teenage women from lower-income families in Bolivia, for example, have fewer years of schooling and are more likely to engage in sexual relations and to get pregnant (Alfonso, 2008). The 2003 Nanda study also reported that lower levels of education were correlated with a higher incidence of adolescent pregnancy as well as with negative health outcomes for offspring among women in India. Panova et al. (2016) identified a similar situation in Russia where those less likely to attend school were more prone to adolescent pregnancy. Less well-educated adolescents are more likely to engage in risky behaviors and to be exposed to environments in which education is not a priority. Poor adolescents are more likely to have parents whose educational attainment is lower, which has a negative impact on the incidence of pregnancy among teenagers. If parents make education a low priority, children have little choice but to drop out of school or to enter the labor market, which exposes them to early relationships. Mothers' educational level is crucial in the incidence of unwanted pregnancy among teenage children.

Family problems also have a negative impact on the incidence of adolescent pregnancy. Panova et al. (2016) showed that a dysfunctional family background could be associated with unwanted pregnancy. If the security and love that a family is supposed to provide are disrupted, adolescent girls may be pursue interpersonal relations with men outside the home (Panova, Kulikov, Berchtold & Suris, 2016) . Moreover, a lack of parental supervision and involvement in the lives of their children can lead to a higher incidence of adolescent pregnancy as noted by Alfonso (2008). Absentee fathers or children not living with their biological fathers add to the risk (Jewkes et al., 2001).

Aside from socioeconomic factors in adolescents' families, adolescent women's educational levels may also have an impact on the incidence of pregnancy. Staying in school keeps adolescent women from getting pregnant; the longer a young woman stays in school, in fact, the higher the "opportunity cost" of pregnancy. At the same time, staying in school could also lead young women to find male partners as their social networks expand. Olson, Clark, and Reynolds (2019) explored these possibilities and focused on age, as an exogenous variable, and its effect on the incidence of pregnancy among adolescent women. The study used a triple-difference regression to investigate beneficiaries of the Bolsa Familia, a conditional-cash-transfer program in Brazil, and particularly on adolescent children who were in school. One condition for the cash transfer was that children 5-18 had to remain in school. Interestingly, the results revealed a three-percentage-point drop in teenage births among program participants. In urban areas, moreover, teenage births dropped significantly—by five percentage points—while there was no drop among adolescents in rural areas. The availability of jobs in the urban area could lead to lower teenage pregnancy. Olson, Clark, and Reynolds (2019) also stressed the importance of education in reducing early pregnancy and discussed the poverty program of the Philippines through its links to education and early pregnancy.

Other literature points to the effects of cultural perceptions of women's roles on adolescent pregnancy in developing countries. In Bolivia, for instance, the incidence of adolescent pregnancy is high because women's role is chiefly perceived to be reproduction

and domestic work and, as a result, women have children early in their teenage years to demonstrate femininity (Alfonso, 2008). Some young women are resigned to the idea that they are best suited to reproducing and doing domestic work and, as a result, they do not pursue higher education, engage in the labor market, or pursue leadership positions in the community. Both the attitudes of highly patriarchal cultures and of religious beliefs regarding sexuality and contraception may also lie at the root of higher adolescent pregnancy rates. (Alfonso, 2008).

Rigid social norms and beliefs can have an impact on adolescent pregnancy as well (Nanda, 2003). For instance, both religion and the caste system in India have been seen to affect age at marriage. Those at the lower end of the caste system are more exposed to poverty, are less likely to use contraceptives during intercourse, and are at a higher risk of adolescent pregnancy, in part because teenagers are not well-informed regarding use of contraception or the repercussions of unprotected sex. In some cultures, getting pregnant deliberately is a way to gain a husband and improve social status (Silberschmidt and Rasch, 2001). Finding a suitable husband and having a family is more important than getting a higher education or a career opportunity.

Conditional-cash-transfer programs have been shown to influence health outcomes positively in developing countries. In a randomized control trial conducted in 2011, Orbeta, Melad, and Araos (2021) pointed out that the 4Ps Program in the Philippines helped keep poor children healthy. For instance, the program resulted in a 10% decline in the incidence of stunting as well as an increase in the intake of Vitamin A and deworming pills. Regular weight monitoring also increased. In 2013, another evaluation of the 4Ps Program showed a positive impact on health outcomes, including an increase in the uptake of prenatal and postnatal care, the growth monitoring of children from birth to 5 years of age, and an increase in the intake of Vitamin A.

Conditional Cash Transfers and the Case of the Philippines

Conditional Cash Transfer: Experiences and Lessons from Mexico

Conditional-cash-transfer programs originated in Latin America in the 1990s. In Mexico, they began as part of an integrated approach to poverty alleviation with the main objective of improving human capital through education and health. Mexico was the first country to design and implement a program aimed at providing transfers to the poor in exchange for sending their children to school and to health clinics for check-ups and vaccinations.

The program in Mexico was first implemented in 1997 and was called *Progresa* (later changed to *Opportunidades*). The program was designed to replace many earlier subsidy and poverty-alleviation programs and was so complex that it needed the support of several government agencies. Under the program, school attendance improved with a consequent decline in adolescent pregnancy, and the incidence of childhood illness decreased (Rawlings & Rubio, 2003). Food expenditure of poor households also increased with the program, allowing family members to consume higher quality food and increase calorie intake (Gantner, 2007), and child health outcomes improved, including an increase in the uptake of prenatal and postnatal checkups and improvements in the weight and height of children. (Skoufias, Parker, Behrman & Pessino, 2001). The program was deemed to be generally successful in improving conditions of the poor and became a model for poverty-alleviation programs in Central and South America (Gantner, 2007).

Pantawid Pamilyang Pilipino Program

The effectiveness of the anti-poverty program in Latin American countries led other developing countries to implement similar programs with customizations for the needs of local stakeholders. In the Philippines, the conditional cash transfer is called the Pantawid Pamilyang Pilipino Program or the 4Ps Program. The 4Ps Program was introduced in 2008 to provide assistance to extremely poor households in order to improve health, nutrition, and education, especially among children aged 18 and younger. In 2019, it became law under Republic Act 11310. Beneficiaries are selected through a proxy means test, which determines families' socioeconomic category by evaluating such variables as ownership of assets, housing type, household head's education, family livelihood, and access to water and sanitation. Beneficiaries must comply with conditions related to health, education, and family development: prenatal and postnatal checkups for pregnant women; immunization, health monitoring and sickness management for children

up to 5; deworming pills, which are administered in school, for children between 6 and 14; enrollment in a day care program or Kindergarten for young children, with a class attendance of at least 85%; enrollment in elementary or secondary school for children 6-18 with a class attendance of at least 85%; and parents' attendance at family development sessions organized by local governments.

The 4Ps Program provides monthly grants to household beneficiaries: a health grant of PhP 750 (USD $15); education grants (PhP 300/USD $6 for kindergarten and elementary students, PhP 500/USD $10 for junior high students; and PhP 700/USD $14 for senior high students); and a monthly rice subsidy of PhP 600/USD $12 per household.[1] Aside from financial grants, parents are automatically given health care insurance through PhilHealth. As of 2021, more than 5,000,000 households had been registered under the 4Ps Program (Department of Social Welfare and Development, 2021) (DSWD, Pantawid Pamilyang Pilipino Program website, 2021).

Several impact evaluation studies have shown that the 4Ps Program improves health and education outcomes of children and pregnant women as well as increases household welfare and community participation, and has a strong impact on well-being of children (Orbeta, Melad & Araos, 2021). The 2020 UNICEF and DSWD report placed child poverty in the Philippines at 23.9% in 2018, and cash-transfer programs were identified as having been effective in achieving that result.

Finally, while the teenage-pregnancy rate stands at 63% in the Philippines and is seen as one of the top three causes of children not attending school, three rounds of impact evaluation studies from 2011 to the present by the Philippine Institute for Development Studies have provided strong evidence that the program helps keep children in school. Orbeta, Melad, and Araos (2021) reported increased school enrollment among children aged 3-11, increased attendance among children aged between 6 and 17, and decreased dropout rates among children aged 12-17. This effect was most evident among girls and young women, especially in the 12-to-17-year-old group. Attendance rates were at 98%, especially for older children whose risk of dropping out of school is higher. The expansion of coverage to children as old as 18 resulted in better education outcomes for older children, implying a reduction in child labor and even teenage pregnancy.

Government Initiative vs. Teenage Pregnancy

2011 World Health Organization study of early pregnancy and poor reproductive outcomes emphasized the need for programs that kept children in school. The study showed that early childhood education, secondary education, and youth-development programs were all effective in reducing pregnancy rates. The United Nations Educational, Scientific and Cultural Organization UNESCO (2017) pointed to socioeconomic marginalization and poverty, which can affect access to and continuation of education, as the main factors in early pregnancy. Just as the 4Ps Program has been shown to increase school attendance and may reduce teenage pregnancy, developing countries should maintain and improve efforts to keep girls and young women in school, both at the primary and secondary levels. Poverty-alleviation programs that help poor families send their children to school and keep them from dropping out are also very helpful in reducing early pregnancy (UNESCO, 2017).

Theory of Change Framework

The impact of a poverty-alleviation program on adolescent pregnancy and the health of teenage mothers can be modelled using a theory-of-change framework, which describes how a program leads to changes in the short and long run. Figure 1 shows how the 4Ps Program led to such short-term outcomes as reduced incidence of teenage pregnancy and improvements in the health of mothers and children. Additionally, the 4Ps Program allowed pregnant women to make more informed choices because they were given more information during family-development sessions. This information campaign can help other members of the family, especially teenagers and eventually helps in reducing the incidence of teenage pregnancy . Among the long term impacts of the 4Ps Program would be improved overall health when the child gets older.

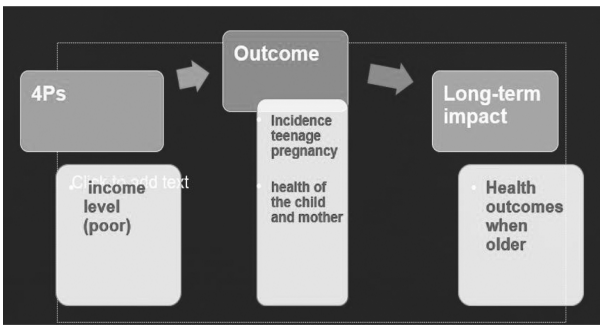

Figure 1. Theory of Change

Methodology

We used data from the Philippines National Demographic and Health Survey (NDHS) for 2013 and 2017. In 2013, the 4Ps Program expanded coverage to almost all regions of the country. The NDHS 2013 database provided the best information available to capture the pre-treatment group and, given that the usual length of the 4Ps Program is five years, the 2017 database provided the nearest post-treatment information .

Difference-in-Differences

The Difference-in-Differences estimator is represented by the interaction term between the treatment group and the post-treatment period for each observation i and time period t. The base model is specified as follows:

$$Y_{it} = \beta_0 + \beta_1 T_i + \beta_2 P_t + \beta_3 P_t * T_i + u_{it} \quad (1)$$

where T_i corresponds to participation in the 4Ps Program; P_t corresponds to the post-treatment year or 2017; and β_3 is the Difference-in-Differences estimate.

Here, the variables of interest are the Incidence of Teenage Pregnancy (a binary variable), child health outcomes (such as infant mortality and birth weight), and maternal health outcomes (antenatal check-ups, postnatal health check-ups, and anemia). Child and maternal health outcomes were restricted to adolescent mothers or to those who had given birth while they were from 15-19.

To further examine the impact of other variables, the full model is specified as follows:

$$Y_{it} = f(T_i, P_t, P_t * T_i, \theta_{it}) \quad (2)$$

where θ_{it} is the vector of family characteristics and endowments that may affect the impact of the 4Ps Program, such as type of residence, educational attainment, gender of household head, household size, type of bathroom, and type of flooring.

Data Sources, Description, and Survey-Design Consistency

We used Philippines National Demographic and Health Survey data. To determine the causal effect of the 4Ps Program, 2013 and 2017 household and individual datasets were merged for a total of 41,229 observations. As these two datasets were not longitudinal, matching was necessary for further analysis. The practice of matching accounts for the confounding influence of pretreatment control variables in survey or experimental data; its main aim is to filter observations from the data in order to leave the remaining data better balanced between treated and control groups (meaning that the empirical distributions of the variables in the groups are more similar). Exactly balanced data means that further controlling for the covariates is immaterial, and, thus, a simple difference in means on matched data can capture causal effects. On the other hand, approximately balanced data requires controlling for the covariates with a model; however, the inferences are interpreted for well-matched observations in the treatment and control groups, which reduces statistical bias.

Coarsened Exact Matching (hereafter, CEM) was performed to match individuals in the two time periods. CEM is a robust method for improving the estimation of causal effects by correcting imbalances between control and treatment groups. It works by binning a set of time-invariant variables, matching the treatment and control groups with these binned (or coarsened) data, and finally running the analysis on the matched strata. It sets thresholds for model dependence and the causal effect estimation error through specification, binding monotonic imbalance such that altering the imbalance in one predictor does not affect others. Moreover, it remains robust to measurement errors and is capable of balancing in-sample nonlinearities and interactions (Blackwell et al., 2009).

Because our study began after program inception, we created a synthetic treatment group. The NDHS contains information on whether a household was registered in the 4Ps Program. The treatment group was composed of beneficiary households in the 2017 round who were registered after 2013, matched with non-beneficiaries in the 2013 round. The control group included individuals in 2013 and 2017 who were non-beneficiaries for the entire period, excluding the synthetic treatment group.

After we performed CEM on time-invariant characteristics such as birth year, ethnicity, age at first birth, and birth order, 33,175 observations remained (14,293 for 2013 and 18,882 for 2017). To ensure that our estimates were survey-design consistent, we followed best practices and performed weighting a

Table 1. *Imbalance Table*

Variable	1 statistics	Difference in Means
Ethnicity	2.80E-14	-1.70E-13
Age at 1st birth	0.04036	0.04946
Birth order	0.06388	0.06388
Year of birth	0.05709	0.13582

Table 2. *Summary Statistics, 2013 and 2017*

	2013					2017				
Variables	**Obs.**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Obs.**	**Mean**	**Std. Dev.**	**Min**	**Max**
Treatment										
Treatment group	14,293	0.2414	0.4279	0	1	18,882	0.2751	0.4465	0	1
Outcomes										
Incidence of Teenage Pregnancy	8,342	0.3221	0.4673	0	1	12,506	0.3150	0.4645	0	1
Antenatal Visits	4,832	6.4790	3.2577	0	27	5,458	6.7392	3.1538	0	20
Born Alive	8,461	.9216	.2687	0	1	12,701	.9270	.2601	0	1
Birth Weight	3,954	2,948	862.6	453	9,000	4,681	3015	691	500	6000
Postnatal Check-Up	4,823	0.8604	0.3465	0	1	5,458	0.7879	0.4088	ee0	1
Independent Variables										
Type of Residence (Rural)	14,293	0.5203	0.4996	0	1	18,882	0.6206	0.4852	0	1
Educational Attainment										
No Education	14,293	0.0229	0.1498	0	1	18,882	0.0181	0.1336	0	1
Primary	14,293	0.3304	0.4703	0	1	18,882	0.3101	0.4624	0	1
Secondary	14,293	0.3577	0.4793	0	1	18,882	0.3825	0.4859	0	1
Higher	14,293	0.2888	0.4531	0	1	18,882	0.2892	0.4532	0	1
Wealth Index										
Poorest	14,293	0.1903	0.3926	0	1	18,882	0.2083	0.4061	0	1
Poorer	14,293	0.1891	0.3916	0	1	18,882	0.2126	0.4092	0	1
Middle	14,293	0.1955	0.3966	0	1	18,882	0.1995	0.3996	0	1
Richer	14,293	0.2062	0.4046	0	1	18,882	0.1943	0.3956	0	1
Richest	14,293	0.2188	0.4135	0	1	18,882	0.1854	0.3886	0	1
Female Head	14,293	0.1758	0.3807	0	1	18,882	0.1864	0.3894	0	1
Household Size	14,293	5.8954	2.4598	1	20	18,882	5.3328	2.2819	1	21
Non-Dirt Flooring	14,293	0.9165	0.2765	0	1	18,882	0.9296	0.2558	0	1
Flush Toilet	14,293	0.8816	0.3230	0	1	18,882	0.8985	0.3019	0	1

two-cluster sampling design. This process allows more conservative standard errors in analysis as compared to the Simple Random Sampling (SRS) assumption.

The imbalance in the matched data is presented in Table 1. Blackwell et al. (2009) proposed the $L1$ statistic, which represents the imbalance between groups, where L 1=0 implies perfect balance. The multivariate distance is 0.3969 for the unmatched data. As seen in the table, the matched $L1$ statistics show evidence for good balance after matching.

Table 2 provides summary statistics for 2013 and 2017. For 2013, 24% were in the treatment group, which roughly corresponds to the national coverage of around 19% (see Philippine Statistics Authority (PSA)

and Inner City Fund (ICF) International, 2014) . A total of 14,293 individuals experienced childbirth during their teenage years. Most of them lived in rural areas (52%), had no education beyond high school (35%), and belonged to a household headed by a man (83%). The average household size was six family members. Most had non-dirt flooring (92%) and a flush toilet (88%), and they were evenly dispersed in standard of living: poorest (19%), poorer (19%), middle (20%), richer (21%), and richest (22%).

In 2017, 28% were beneficiaries of the conditional-cash-transfer program, slightly higher than the reported national coverage of around 21% of Philippine households (Acosta et al., 2019). Additionally, the following were observed among the 18,882 individuals: most lived in rural areas (62%), had no education beyond high school (38%), and belonged to a household headed by a man (81%); average household size was five members. Most had non-dirt flooring (93%) and a flush toilet (89%). As in 2013, individuals were more-or-less evenly dispersed across the wealth index: poorest (21%), poorer (21%), middle (20%), richer (19%), richest (19%).

Table 3 provides variable definitions and sources used in estimating Equation 2. All covariates or controls are largely standard in the literature. The NDHS was the primary data source for all variables.

Before examining the short-term impacts of the conditional-cash-transfer program on teenage pregnancy and maternal health outcomes, it is important to confirm the absence of selection bias in program allocation. As per the research design, the baseline covariates for treatment and control groups for both years were compared. For all outcome variables

Table 3. *Variable Descriptions (Demographic Health Survey)*

Category	Variable	Variable Description
Outcome	The Incidence of Teenage Pregnancy	Binary variable indicating whether or not individual became pregnant.
Outcome	Antenatal Visits	Number of visits made by the mother before birth.
Outcome	Born Alive	Binary variable indicating whether the mother's child was born alive (1 = born alive; 0 = otherwise).
Outcome	Birth Weight	Birth weight of the infant as measured in grams.
Outcome	Postnatal Check-Up	Binary variable indicating whether the mother had a postnatal check-up within two months of giving birth (1 = yes; 0 = no).
Independent Variable	Type of Residence (Rural)	Binary variable denoting the type of residence of the mother (1 = rural; 0 = urban).
Independent Variable	Educational Attainment	Level of educational attainment on a categorical scale (3 = higher education; 2 = secondary education; 1 = primary; 0 = no education, preschool).
Independent Variable	Wealth Index	An index measuring a household's living standard based on ownership of assets, housing, sanitation access, among others (5 = richest; 4 = richer; 3 = middle; 2 = poorer; 1 = poorest).
Independent Variable	Woman Household Head	Binary variable describing the gender of the household head (1 = woman; 0 = man).
Independent Variable	Size of Household	Number of household members.
Independent Variable	Non-Dirt Flooring	Binary variable that indicates the material of the household flooring (1 = non-dirt floor; 0 = dirt floor).
Independent Variable	Flush Toilet	Binary variable that indicates type of toilet used by the household (1 = flush toilet; 0 = other type of toilet).

Table 4. Differences in Means between 4Ps Program Non-Beneficiaries and Beneficiaries

Outcomes	Diff.
Incidence of Teenage Pregnancy	-0.0138
	(-1.59)
Antenatal Visits	-0.112
	(-0.61)
Birth Weight of Child (in grams)	-0.00688
	(-0.08)
Baby Born Alive	-0.00105
	(-0.09)
Had Postnatal Check-Up within Two Months	.0167212
	(0.0079)

*Notes: Results for two-sample t-test are reported for continuous variables (antenatal visits, birth weight); results for two-sample test of proportions are reported for dichotomous variables (incidence of teenage pregnancy, baby born alive, postnatal check-up with two months). Asterisks denote significance levels: * p<0.10; ** p<0.05; *** p<0.01.*

Table 5. *Effect of 4Ps Program on Incidence of Teenage Pregnancy*

	(1) Base Model	(2) With Type of Residence	(3) With Wealth Index	(4) Full Model
4Ps Program Beneficiary	0.118***	0.110***	0.0209	-0.00668
	(0.013)	(0.013)	(0.014)	(0.014)
Post-Treatment	-0.0159*	-0.0174*	-0.0182**	-0.00231
	(0.010)	(0.010)	(0.009)	(0.009)
Difference-in-Differences	0.0179	0.0179	0.0311	0.0224
	(0.019)	(0.019)	(0.019)	(0.018)
Type of Residence (Rural)		0.0288***	0.0216**	0.0252***
		(0.009)	(0.009)	(0.009)
Wealth Index (Base: Poorest)				
Poorer			-0.0778***	-0.0536***
			(0.013)	(0.015)
Middle			-0.136***	-0.101***
			(0.014)	(0.015)
Richer			-0.192***	-0.142***
			(0.014)	(0.017)
Richest			-0.275***	-0.203***
			(0.015)	(0.018)
Educational Attainment (Base: No Education)				
Primary				-0.107***
				(0.031)
Secondary				-0.152***
				(0.032)
Tertiary				-0.229***
				(0.032)
Woman Household Head				-0.0114
				(0.012)
Household Members				0.0169***
				(0.002)
Has Flush Toilet				-0.0322*
				(0.019)
Has Flooring				0.513***
				(0.038)
Constant	0.282***	0.270***	0.454***	
	(0.007)	(0.008)	(0.014)	
Observations	20,830	20,830	20,830	20,815
R^2	0.013	0.014	0.045	0.063

*Notes: Asterisks denote significance levels: * p<0.10; ** p<0.05; *** p<0.01.*

relevant to this research, no significant differences exited at baseline between the treatment and control groups.

Difference-in-Differences Results

Table 5 shows the effect of the conditional-cash-transfer program on teenage pregnancy using the standard Difference-in-Differences model (hereafter, DID) for (1) the base model with no controls, (2) the model with rural controls, (3) the model with wealth-index controls, and (4) the model with all controls. The results show that, although the incidence of teenage pregnancy decreased by around one percentage point from 2013 to 2017 for Models 1-3, no significant direct effect of the 4Ps Program appeared to exist, a finding that was robust across all specifications. Furthermore, a significant correlation existed to the household-wealth index: those in the richest category experienced twenty to twenty-seven percentage points fewer teenage pregnancies than did the poorest segment. Moreover, education did indeed appear to lower the incidence of teenage pregnancy, as shown in Model 3, and this effect increased with higher levels of educational attainment. Additionally, both the presence of a flush toilet and flooring in the household seemed to reduce the incidence of the incidence of teenage pregnancy to

Table 6. *Effect of 4Ps Program on Birth Weight (Grams)*

	(1) Base Model	(2) With Type of Residence	(3) With Wealth Index	(4) Full Model
4Ps Program Beneficiary	13.85	19.95	54.16	62.73*
	(35.473)	(35.298)	(36.153)	(36.224)
Post-Treatment	75.49***	77.26***	80.20***	77.47***
	(25.333)	(25.345)	(24.928)	(25.231)
Difference-in-Differences	-28.45	-28.10	-32.44	-31.71
	(49.942)	(50.055)	(49.857)	(50.432)
Type of Residence (Rural)		-25.86	-5.421	-5.452
		(22.055)	(23.740)	(23.529)
Wealth Index				
(Base: Poorest)				
Poorer			-24.11	-29.92
			(30.721)	(34.717)
Middle			2.896	-4.634
			(32.740)	(38.143)
Richer			33.67	21.23
			(38.675)	(43.585)
Richest			133.8***	113.5**
			(40.954)	(48.130)
Educational Attainment				
(Base: No Education)				
Primary				86.14
				(87.960)
Secondary				76.33
				(88.490)
Tertiary				115.8
				(90.847)
Woman Household Head				8.091
				(31.882)
Household Members				-4.457
				(4.495)
Has Flush Toilet				34.36
				(43.937)
Has Flooring				-25.13
				(36.494)
Constant	2949.4***	2960.1***	2915.9***	2851.6***
	(19.730)	(22.770)	(35.851)	(105.864)
Observations	2,504	2,504	2,504	2,504
R^2	0.002	0.002	0.007	0.007

*Notes: Asterisks denote significance levels: * p<0.10; ** p<0.05; *** p<0.01.*

some degree. We noted a weak significant correlation to the gender of the household head; the presence of women heads of household may have reduced the incidence of teenage pregnancy by around two percentage points.

Table 6 reports the correlation of the program on children's birth weight. While there appears to be an increase in weight of 75-80 grams between 2013 to 2017, DID estimates were not significant. Infants born into the richest households, however, appeared to be 113.5-133.8 grams heavier at birth than were those born into the poorest households. Additionally, we observed a weak significant correlation of tertiary education on increased birth weight.

Table 7, on the other hand, reports the correlation of the 4Ps Program on infant survival for adolescent mothers. Again, while there is a significant increase in infant survival of six to seven percentage points from 2013 to 2017 across all models, DID estimates were not significant. Education, however, did appear to have a positive effect, increasing infant survival by more than ten percentage points. Moreover, we observed a

Table 7. *Effect of 4Ps Program on Infant Survival Rate*

	(1) Base Model	(2) With Type of Residence	(3) With Wealth Index	(4) Full Model
4Ps Program Beneficiary	0.00914	0.0118	0.0149	-0.00372
	(0.016)	(0.016)	(0.016)	(0.016)
Post-Treatment	0.0646***	0.0652***	0.0656***	0.0710***
	(0.008)	(0.008)	(0.008)	(0.008)
Difference-in-Differences	-0.0321	-0.0322	-0.0330	-0.0476**
	(0.023)	(0.023)	(0.023)	(0.023)
Type of Residence (Rural)		-0.0107	-0.00842	-0.00871
		(0.007)	(0.007)	(0.007)
Wealth Index (Base: Poorest)				
Poorer			-0.00229	-0.0113
			(0.010)	(0.011)
Middle			0.00166	-0.0138
			(0.010)	(0.012)
Richer			0.00184	-0.0205
			(0.010)	(0.013)
Richest			0.0140	-0.0158
			(0.011)	(0.014)
Educational Attainment (Base: No Education)				
Primary				0.126**
				(4.100)
Secondary				0.184**
				(5.850)
Tertiary				0.105**
				(3.220)
Woman Household Head				0.00359
				(0.009)
Household Members				0.0118***
				(0.001)
Has Flush Toilet				-0.00495
				(0.012)
Has Flooring				0.0147
				(0.013)
Constant	0.878***	0.882***	0.878***	0.794***
	(0.007)	(0.007)	(0.011)	(0.030)
Observations	5,560	5,560	5,560	5,560
R^2	0.012	0.012	0.012	0.023

*Notes: Asterisks denote significance levels: * p<0.10; ** p<0.05; *** p<0.01.*

moderately significant negative correlation between infant survival and the number of household members and a woman household head.

According to the terms of the conditional-cash-transfer program, expectant mothers were to have regular check-ups during pregnancy. Table 8 reports DID regression results for this variable for adolescent mothers in the dataset. Similar to previous results, a significant uptick in visits appears to have taken place between 2013 and 2017, though this did not seem to be attributable to the program alone because DID estimates were not significant. Notably, a rural resident appeared to make significantly fewer antenatal visits (0.2-0.8 fewer) than their urban counterparts across Models 2 to 4. Additionally, educational attainment was significantly correlated with antenatal visits, and the effect increased as did educational level. Tertiary graduates appear to have around 1.5 more visits over

Table 8. *Effect of 4Ps Program on Antenatal Visits during Pregnancy*

	(1) Base Model	(2) With Type of Residence	(3) With Wealth Index	(4) Full Model
4Ps Program Beneficiary	-1.052***	-0.825***	0.160	0.360***
	(0.105)	(0.106)	(0.108)	(0.109)
Post-Treatment	0.281***	0.319***	0.402***	0.274***
	(0.108)	(0.110)	(0.099)	(0.100)
Difference-in-Differences	-0.0532	-0.0522	-0.267	-0.198
	(0.178)	(0.174)	(0.170)	(0.171)
Type of Residence (Rural)		-0.888***	-0.231**	-0.218*
		(0.106)	(0.111)	(0.113)
Wealth Index (Base: Poorest)				
Poorer			0.854***	0.535***
			(0.114)	(0.110)
Middle			1.387***	1.000***
			(0.141)	(0.147)
Richer			2.186***	1.750***
			(0.143)	(0.146)
Richest			3.433***	2.961***
			(0.180)	(0.203)
Educational Attainment (Base: No Education)				
Primary		a		1.096***
				(0.284)
Secondary				1.117***
				(0.286)
Tertiary				1.480***
				(0.300)
Woman Household Head				-0.160
				(0.118)
Household Members				-0.133***
				(0.016)
Has Flush Toilet				0.908***
				(0.129)
Has Flooring				0.0724
				(0.120)
Constant	7.009***	7.403***	5.391***	4.450***
	(0.073)	(0.089)	(0.145)	(0.319)
Observations	3,032	3,032	3,032	3,032
R^2	0.021	0.039	0.135	0.157

*Notes: Asterisks denote significance levels: * p<0.10; ** p<0.05; *** p<0.01.*

the base (no education). The number of household members seemed to negatively affect antenatal visits (coefficient = -0.13). Finally, the presence of a flush toilet appeared to significantly increase visits by 0.9.

Table 9 reports the results of attendance at postnatal check-ups within two months after birth. Again, the 4Ps Program seem to have no significant impact, though, rural residents seemed to be some five percentage points less likely to have postnatal check-ups within the specified time period. Moreover, educational attainment appeared to have a positive significant correlation of more than sixteen percentage points on check-ups (compared to the baseline of no education).

Table 10 reports the results of ordered logistic regressions on levels of educational attainment for adolescent mothers (no education, primary, secondary, and tertiary education). For both the base model and the model that included rural residence, we noted a significant and positive average treatment effect on the treated, with beneficiaries having a 0.474 and 0.379

Table 9. *Effect of 4Ps Program on Postnatal Check-Ups*

	(1) Base Model	(2) With Type of Residence	(3) With Wealth Index	(4) Full Model
4Ps Program Beneficiary	-0.00740	0.00726	0.0179	0.0176
	(0.012)	(0.012)	(0.013)	(0.013)
Post-Treatment	-0.0505***	-0.0480***	-0.0471***	-0.0474***
	(0.012)	(0.012)	(0.011)	(0.012)
Difference-in-Differences	-0.0145	-0.0145	-0.0171	-0.0201
	(0.021)	(0.021)	(0.021)	(0.021)
Type of Residence (Rural)		-0.0573***	-0.0503***	-0.0504***
		(0.011)	(0.012)	(0.012)
Wealth Index (Base: Poorest)				
Poorer			0.0155	0.00477
			(0.015)	(0.016)
Middle			0.0180	0.00601
			(0.016)	(0.018)
Richer			0.0252	0.0123
			(0.017)	(0.020)
Richest			0.0374**	0.0251
			(0.018)	(0.022)
Educational Attainment (Base: No Education)				
Primary				0.155***
				(0.041)
Secondary				0.152***
				(0.041)
Tertiary				0.149***
				(0.042)
Woman Household Head				0.000585
				(0.013)
Household Members				0.000591
				(0.002)
Has Flush Toilet				0.0194
				(0.018)
Has Flooring				-0.000908
				(0.018)
Constant	0.869***	0.894***	0.870***	0.710***
	(0.007)	(0.009)	(0.016)	(0.049)
Observations	3,036	3,036	3,036	3,036
R^2	0.005	0.011	0.012	0.015

*Notes: Asterisks denote significance levels: * p<0.10; ** p<0.05; *** p<0.01.*

Table 10. *Effect of 4Ps Program on Educational Attainment*

	(1) Base Model	(2) With Type of Residence	(3) Full Model
4Ps Program Beneficiary	-1.405***	-1.213***	-0.269***
	(0.057)	(0.058)	(0.064)
Post-Treatment	0.0419	0.125***	0.189***
	(0.035)	(0.035)	(0.037)
Difference-in-Differences	0.474**	0.379**	0.0439
	(0.184)	(0.187)	(0.194)
Type of Residence (Rural)		-0.812***	-0.245***
		(0.033)	(0.037)
Wealth Index (Base: Poorest)			
Poorer			0.573***
			(0.061)
Middle			1.093***
			(0.065)
Richer			1.778***
			(0.069)
Richest			2.889***
			(0.073)
Woman Household Head			-0.00543
			(0.044)
Household Members			-0.0924***
			(0.007)
Has Flush Toilet			0.716***
			(0.069)
Has Flooring			0.0874
			(0.070)
Constant	0.869***	0.894***	0.870***
	-0.007	-0.009	-0.016
Observations	5,309	5,309	5,309
Pseudo R^2	0.0245	0.0439	0.1437

*Notes: Asterisks denote significance levels: * p<0.10; ** p<0.05; *** p<0.01.*

increase in the log odds of attaining a higher level of education relative to non-beneficiaries (base model and rural-residence model, respectively). However, once we accounted for wealth and other controls, the ATET was no longer significant. Residence in a rural area and a greater number of household members were negatively associated with educational attainment, as has been reported the literature. Greater wealth and sanitation, on the other hand, were associated with greater odds of attaining higher education.

Table 11 reports the average marginal effect for e ach level of educational attainment for each group in the pre-treatment period. Significant effects for beneficiaries were noted in the base model, implying that the probabilities that 4Ps Program beneficiaries would have no education or primary education were 2.6 and 9.9 percentage points lower, respectively, in comparison to the pre-treatment period. Moreover, the marginal effects indicated that the predicted probabilities that beneficiaries would attain secondary and tertiary education were 6.7 and 5.8 percentage points higher, respectively, than they were prior to subjects' enrollment in the conditional-cash-transfer program.

Marginal effects with type of residence appeared largely similar, with a decreased probability of attaining lower levels of education (no education or primary), and an increased probability of attaining higher levels of education (secondary or tertiary) compared to the pre-treatment period. In addition,

Table 11. *Average Marginal Effect of 4Ps Program on Educational Outcomes*

Base: Pre-Treatment	(1) Base Model	(2) With Type of Residence	(3) Full Model
Education: No Education			
Post * Non-4Ps Program Beneficiary	-0.001	-0.002***	-0.002**
	(0.001)	(0.001)	(0.001)
Post * 4Ps Program Beneficiary	-0.026***	-0.023***	-0.010
	(0.008)	(0.007)	(0.006)
Education: Primary			
Post * Non-4Ps Program Beneficiary	-0.008	-0.023***	-0.015**
	(0.007)	(0.006)	(0.006)
Post * 4Ps Program Beneficiary	-0.099***	-0.097***	-0.049
	(0.037)	(0.037)	(0.035)
Education: Secondary			
Post * Non-4Ps Program Beneficiary	-0.001	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)
Post * 4Ps Program Beneficiary	0.067***	0.058***	0.024
	(0.021)	(0.018)	(0.015)
Education: Tertiary			
Post * Non-4Ps Program Beneficiary	0.009	0.026***	0.018**
	(0.008)	(0.007)	(0.007)
Post * 4Ps Program Beneficiary	0.058**	0.062**	0.034
	(0.024)	(0.026)	(0.027)

*Notes: Asterisks denote significance levels: * p<0.10; ** p<0.05; *** p<0.01.*

statistically significant secular trends were found (non-4Ps Program beneficiaries), with probabilities for each level of education decreasing in the post-treatment period; the exception was tertiary education, which showed a positive marginal effect (2.6 percentage points higher).

Finally, for the full model including wealth indicators and other control variables, significant marginal effects were observed only in the secular trends, generally following the model with type of residence.

Conclusions and Recommendations

Using standard CEM and DID methodology, we studied the effect of the conditional cash transfer in the Philippines on education and maternal and child health. To eliminate sample-selection bias, two-sample t-tests and tests of proportions were performed accordingly, revealing no statistically significant differences between the treatment and control groups after matching.

First, the 4Ps Program had a positive impact on higher levels of education for adolescent girls. On the other hand, while health outcomes such as infant birth weight, infant survival rate, and antenatal visits improved from the 2013 to 2017, and the incidence of teenage pregnancy declined, these improvements did not appear to be the direct result of the 4Ps Program based on DID estimates. However, an increased standard of living (as measured by the wealth index) did appear to have a significant correlation with decreased incidence of teenage pregnancy and increased antenatal visits, as well as a weaker correlation with increased

infant birth weight and postnatal check-ups. Moreover, we noted a significant link between higher levels of educational attainment and decreased the incidence of teenage pregnancy, increased infant survival rate, and improved maternal health outcomes (antenatal and postnatal check-ups). The 4Ps Program also seemed to affect the level of education of adolescent mothers positively and significantly, although this effect was moderate when we controlled for such other factors as wealth and sanitary conditions.

Though health outcomes and teenage pregnancy were not directly linked to the 4Ps Program, higher levels of educational attainment and increased standard of living are seen as important factors that can lead to improved health and avoid teenage pregnancy. The 4Ps Program is intended to break the intergenerational cycle of poverty through investment in human capital (i.e., keeping children in school and providing health care and nutrition). In addressing poverty, this long-term goal may allow the poor to make better-informed rational decisions. Through access to health care and education, the 4Ps Program can help expand opportunities for beneficiaries. Being in school may reduce teenage pregnancy because it increases opportunity cost, especially at higher levels of education.

Policy Recommendations

Based on our results regarding educational outcomes, we recommend the following:

(1) The current 4Ps Program grants financial support to students until they have completed senior high school. Aside from those financial grants, it would be worth considering an expansion of the 4Ps Program to provide supplementary materials such as school supplies, uniforms, and footwear in order to strengthen the resolve of students to stay in school and perhaps to eventually take a college or vocational degree. The concept is similar to the rice subsidy that was added a few years ago: Once parents had one less essential food item to worry about, they could use their resources to buy more nutritious food; supplemental educational materials could potentially also ease parents' financial burdens so they can focus on the family's other needs.

(2) On the supply side, local and national government, through the Department of Health and the Department of Education, should continue strengthening infrastructure and staffing to improve delivery of quality education and health care to 4Ps Program beneficiaries.

(3) Positive impacts on health outcomes for infants, especially birth weight, underscore the importance of being mindful that the healthcare infants receive during their first 1,000 days. sets the foundation for improved quality of life in later years. Both prenatal and antenatal health care should be prioritized with a focus on ensuring a high compliance rate among beneficiaries, possibly by organizing and advertising health services more effectively.

Further studies should be undertaken to gather additional insights into the 4Ps Program's ability to affect teenage pregnancy, including whether the program potentially encourages beneficiaries to bear children in order to receive cash grants. It would be worthwhile to further investigate other factors affecting teenage pregnancy in the country.

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