A Propensity Scores Method and Logistic Regression Analysis of the Pantawid Pamilyang Pilipino Program in the National Capital Region

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Abstract: For the current administration to commit to its promised change, an evaluation of past ones is paramount. Massive poverty has been a problem for every administration and its eradication is the basis on which all government programs emanate. Established under President Gloria Arroyo's administration and expanded during President Benigno Aquino III's term, the Pantawid Pamilyang Pilipino Program (4Ps) aims to address persistent poverty in the Philippines. By providing social assistance to the poor in the form of cash incentives provided they comply to certain socio-economic conditions, 4Ps focuses on reducing poverty ranks and promotes human development of the poor to break the intergenerational poverty cycle. It benefitted 340,391 in 2008 and this increased to 3,038,420 by September 2012. A total of USD805 million was borrowed from the World Bank and the Asian Development Bank since its expansion in 2008.

Since its establishment in 2007, few studies about 4Ps have been conducted. Using logistic regression and propensity score methods in SAS, this paper evaluated the effect of the 4Ps on the health center visits and school attendance of poor individuals from the National Capital Region. Similar studies on Brazil's Bolsa Familia and Mexico's Oportunidades were able to identify the significant increase in the utilization of health care programs by the beneficiaries' children.Compared to poor non-beneficiaries, being a beneficiary of 4Ps translated to an increased likelihood in visiting health centers and attending school. However, it was observed that, compared to younger beneficiaries, older beneficiaries were less likely to attend school. These results serve as concrete evidence for objective prioritization of program improvements.

Key Words: 4Ps; cash incentives; propensity scores; logistic regression

1. INTRODUCTION

1.1 Conditional Cash Transfer Programs

"Give a man a fish and you feed him for a day. Teach a man to fish and you feed him for a lifetime." In line with this proverb, Conditional Cash Transfer (CCT) programs have been globally introduced to address chronic poverty by investing in human development that will benefit the poor. These benefits are contingent on compliance with social services such as education, health, and nutrition. Simply granting cash to the poor, in the long run, will not suffice. However, by imposing certain conditionalities, the poor will be involved in a commitment that will empower them and put an end to the poverty cycle (Son, 2008). Examples of CCTs around the world are Bolsa Familia in Brazil and Oportunidades in Mexico.

1.2 Poverty in the Philippines

According to the latest statistical data on poverty in the Philippines conducted by the Asian Development Bank, 25.2% of Filipinos live below the national poverty line as at 2014. In comparison to the rest of Southeast Asia in terms of poverty status, the Philippines is ranked second, right after Myanmar. Also, one of the reasons why poverty reduction in the Philippines has been considered slow compared to its neighboring ASEAN countries is the gap between the richest 20% and poorest 20% of the population (Aldaba, 2009).

1.3 4Ps

Patterned after the basic structure of a CCT program, the Philippines piloted the Pantawid Pamilyang Pilipino Program (4Ps) in 2008. 4Ps is based on the premise that poverty is multi-dimensional; it is not solely based on income alone. 4Ps provides conditional cash grants to poor households conducive to the improvement of their education, health, and nutrition status. According to the Department of Social and Welfare Development (DSWD), the main objective of the program is to impede the intergenerational transmission of poverty by keeping children in school, keeping children healthy, and investing in the future of the children.

For the selection of household-beneficiaries, the poor are identified through the use of LISTAHANAN, also known as the National Household Targeting System for Poverty Reduction (NHTS-PR). It is an information management system that aims to know who are the poor and where they are located in the country. The government secured a total of USD805 million or PHP34.6 billion loan to finance the expansion of the 4Ps (De Los Reyes, 2011). Through the use of logistic regression and propensity score methods in SAS, this paper will: (i) assess if the program is properly implemented -the beneficiaries show collaborative compliance with the conditionalities, specifically visiting health centers and attending school, as compared to non-beneficiaries, (ii) identify which areas of the program design need improvement, and (iii) provide justification for the further development of the program.

2. METHODOLOGY

2.1 Propensity Scores Method and Logistic Regression

Propensity scores methods (PSM) can be used for the pre-treatment of observational data, like comparing between the effects on treatment and non-treatment groups. Shei, Costa, Reis, and Ko's (2014) study on the Bolsa Familia also used PSM to remove bias associated with covariates such as household, mother, and child's characteristics.

For this study, the covariates observed are (1) age; (2) disability; (3) problem in (a) seeing, (b) hearing, (c) walking, (d) remembering, (e) self-caring, and (f) communicating; (4) educational attainment; (5) marital status; (6) employment; and (7) solo parent status (only for pregnant analysis); and (8) sex (dropped for pregnant analysis). The logistic regression for attending health centers was performed on pregnant women, children 0 to 5 years old, and children 6 to 14 years old. Similarly, for attending school it was analyzed for children aged 6-11, 12-14, and 15-17 years old. These subgroups were patterned after the Impact Evaluation done by DSWD on 4Ps last 2014 using LISTAHANAN 1..

Using proc logistic, the propensity scores for the groups mentioned above were calculated. The treatment variable pppp was predicted using the covariates labeled assessment_age, sex_id, pregnant_id, disability, fd_a, fd_b, fd_c, fd_d, fd_e, fd_f, educ_attain, employed, marital_stat, and,

solo_parent depending on the group. The propensity scores are stored in the assigned data set under the variable name ps. The following code is for the estimation of the propensity scores using the covariates for the pregnant variable. It is patterned after Leslie and Thiebaud's (2007) codes from their paper titled "Using Propensity Scores to Adjust for Treatment Selection Bias". A similar flow for the codes also followed for the remaining subgroups.

```
proc logistic data = s.pregnant descending;
class marital_stat;
model pppp = assessment_age disability fd_a fd_b fd_c fd_d fd_e fd_f educ_attain marital_stat employed solo_parent/ link=logit rsquare;
output out=s.psm_pregnant pred=ps;
run;
```

After creating the propensity scores, an evaluation of the distributions by treatment groups checks for sizeable overlap among the groups demonstrating that the groups are comparable. To further support the rationale, the means, medians, and modes of each treatment groups are also presented.

```
proc univariate data = s.psm_pregnant;
by pppp;
var ps;
histogram;
run;
```

The following code calculates for the Inverse Property of Treatment Weights (IPTW), which is the inverse of the propensity score. The beneficiaries (pppp=1) will receive an IPTW of 1/ps and the non-beneficiaries (pppp=0) will receive an IPTW of 1/(1-ps).

```
data s.psm_pregnant;
set s.psm_pregnant;
if pppp=1 then ps_weight=1/ps;
else ps_weight=1/(1-ps);
run;
```

Finally, the generated weights are used in the logistic regression model to evaluate the effect of being a 4PS beneficiary to the variables attending_health_center and attending_school. Again, the format of the following code will be followed for the remaining subgroups and for the logistic regression for the attending_school variable.

```
proc logistic data=s.psm_pregnant descending;
model attending_health_center = pppp / corrb link = logit
alpha = 0.05 clparm = wald clodds = wald;
weight ps_weight;
ods output ORplot = s.OR_pregnant;
run;
```

3. RESULTS AND DISCUSSION

3.1 Descriptive Statistics

Table 1 gives us the total number of 4Ps beneficiaries and non-beneficiaries on school attendance and health center visits by age groups. Table 2 provides us with an overview of the compliance rate of beneficiaries for November and December 2014.

Table 1. Total number of 4Ps Beneficiaries and Non-Beneficiaries on School Attendance and Health Center Visits

	Subgroup	Bene	NonBene	Total
School Attendance	6 to 11 Years Old	10,962 (46)	12,764 (54)	23,726
	12 to 14 Years Old	4,713 (50)	4,805 (50)	9,518
	15 to 17 Years Old	3,094 (48)	3,418 (52)	6,512
Health Center Visits	0 to 5 Years Old	7,062 (34)	13,469 (66)	20,531
	6 to 14 Years Old	15,675 (47)	17,569 (53)	33,244
	Pregnant	273 (33)	562 (67)	835

Table 2. Compliance Rates of 4Ps Beneficiaries for November and December 2014

	Subgroup	November	December
Educational Conditions	3 to 5 Years Old	96.71%	96.80%
	6 to 14 Years Old	98.02%	98.27%
	15 to 18 Years Old	96.80%	97.11%
Health Conditions	0 to 5 Years Old	86.86%	87.49%
	Pregnant	86.16%	99.48%

3.2 Odds Ratio Analysis

Being a 4Ps beneficiary increased the odds of health center visits for pregnant women (OR = 1.295, p <.001), children 0 to 5 years old (OR = 1.558, p <.001), and children 6 to 14 years old (OR = 1.629, p <.001). Similarly, 4PS also significantly affected school attendance for children 6 to 11 years old (OR = 1.490, p <.001), children 12 to 14 years old (OR = 1.507, p <.001), and children 15 to 17 years old (OR = 1.112, p <.001). Refer to Figures 7, 8, and 9. In addition, note that the non-overlap in the confidence levels of the odds ratio in Figure 9 means there is a significant difference between the effect for the children aged 15-17 and the other subgroups.
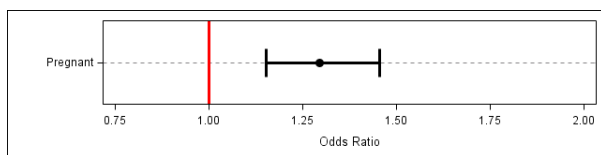

Fig 7. Odds ratio and 95% confidence interval for the effect of 4Ps on Health Center Visits of Pregnant Women.
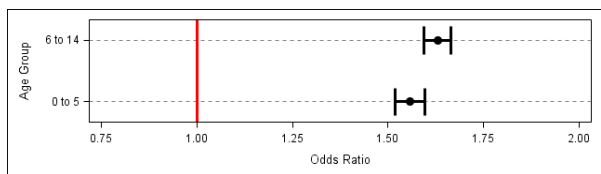

Fig 8. Odds ratio and 95% confidence interval for the effect of 4Ps on Health Center Visits of Children by Age Groups.
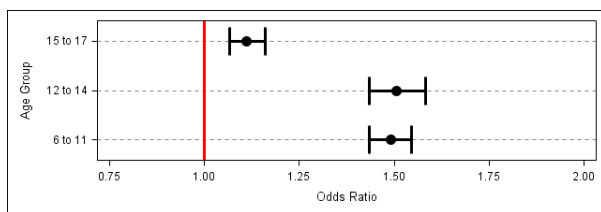

Fig 9. Odds ratio and 95% confidence interval for the effect of 4Ps on School Attendance of Children by Age Groups.

4. CONCLUSIONS

The 4Ps presents an engaging deal of promise for the poor families that constitute most of the Philippines' population. By setting health and education conditionalities, the program prompts its poor beneficiaries to utilize the existing social services, thereby improving their human capabilities in the long run. Being a beneficiary of 4Ps translates to an increased likelihood in visiting health centers and attending school. Accordingly, the researchers support the principle behind 4Ps that healthy and educated citizens are essential for a productive society.

However, 4Ps may also be subject to insufficiencies during its implementation. To illustrate, it was observed that the odds ratio of going to school for children aged 15-17 is significantly lower compared to the younger subgroups. This indicates that older children are less concerned with their education as they may be more inclined to provide for the family by working instead. This is a possible area of improvement for the program as the attainment of higher education of a family member is a better means of alleviating a family from poverty than underage labor. Lastly, to ensure the continuity and effectiveness of 4Ps from one administration to another, the government and the citizens must perform their corresponding duties through collaborative compliance.

To allow for better evaluation of the 4Ps, it is recommended by the researchers that data on the specific utilization of government health services between beneficiaries and non-beneficiaries be explored. This includes vaccinations, physical growth monitoring, and reproductive health awareness. In depth variables on education should also be included besides school attendance, such as enrollment and dropout rates. An analysis using national data would provide more diverse results.

For the objective of identifying where project management has improved from the past administration to the next, similar analysis for more recent data should be analyzed using similar methods. Additional statistical analyses for different variable types associated with the 4Ps could also be implemented.

In future studies, it would also be valuable to check the effect of 4Ps on the

attendance of the beneficiaries in government programs not indicated in the conditionalities. Research focus on the 4Ps is encouraged as the results showed positive effects on the beneficiaries.

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