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Household choices, circumstances and equity of access to basic health and education services in the Philippines

by

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Abstract

In developing countries like the Philippines, a major policy concern is the inequity in access to health and education services. In this paper, we investigate the effects of factors over which households have control ("choices") or none ("circumstances") on their access to basic services. Our logit regression analyses of two nationwide household surveys reveal that household income and composition, mother's age and education status, and the child's age and gender are critical. The circumstance factors – Philhealth coverage and some area-level characteristics of health and education services –also matter in improving overall access, but not necessarily its equity.

Key words: Households, equity, health, education, Philippines
JEL Classifications: I18, I28, I38

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1. Introduction

Health and education are important aspects of human development. In developing countries, however, households with low health status often also have inferior educational achievements and live in areas with low levels and poor quality of public services. The observed inequalities in health or education outcomes could be the result of households' choices, the circumstances that define their opportunities, or both. From policies that reduce overall inequalities in outcome, increasingly policies that reduce inequities in opportunities are advocated (World Bank 2006, Williams and Cookson 2000). The policy shift finds support from Sen (1985), Dworkin (1981) Rawls (1971) and especially Roemer (1998) who argued that inequalities arising from differences in household or individual choices (or "effort") are not as unfair as those arising from differences in opportunities (or "circumstance") over which the household or individual has no control. The government thus should pursue policies to offset the social or economic disadvantages associated with gender, ethnicity, location of birth or family background. Evidence of the adverse effects of some of these circumstance variables on economic outcomes are found in Latin America, Africa and Italy (e.g., Paes de Barros, Ferrreira, Molinas Vega and Chanduvi 2009, Bourguignon, Ferreira and Menendez 2007, Checchi and Peragine 2005, Cogneau and Mesple-Somps 2008). This paper adopts a similar approach to investigate the consequences of choice and circumstance factors on the access to and equity of health care and education services in the Philippines.

The Philippine government remains committed to provide universal access to basic health care and education, as mandated in the 1987 Constitution and evidenced further by its support to the Millennium Development Goals (MDGs). In health, the

government specifically aims to reduce the child mortality rate, maternal mortality rate, prevalence of underweight children, and the incidence of malaria and other major diseases. Through its *Four*mula One for Health, the Department of Health (DOH) adopts key reform strategies in health financing, regulation, service delivery and governance to provide secure, quality and equitable health services to all, particularly the poor. A major component of the strategy is to secure public funds to provide health insurance coverage to five million poor and near poor households towards the target of universal insurance coverage by 2013.

Through its Basic Education Sector Reform Agenda (BESRA), the Department of Education (DepEd) endeavors to make all adults functionally literate and all school-age children enroll, stay in school, and finish basic education satisfactorily (Department of Education 2006). To improve student performance, the BESRA's main thrust is to improve the capacity and responsiveness of schools to the needs of the students, with inputs from the students, parents, local governments and the larger community. Thus much like the DOH's own strategy, DepEd adopts a decentralized approach when it delegates additional functions to local education officials, and by making them more accountable to their service clients.

The challenges facing the government remain considerable. In the health sector, the infant and child mortality rates have only declined gradually from about 38 and 64 deaths per thousand in 1993 to about 24.9 and 33.5 deaths per thousand in 2008. The decline in maternal mortality rates has likewise been slow, from 209 to about 162 deaths per thousand from 1998 to 2006. These rates of decline are insufficient to meet the Philippine 2015 MDG targets for child and maternal mortality reductions. Further, rates

of infant mortality decline are below those of other comparable ASEAN countries and mask provincial variations in outcomes.

Utilization of selected health services, skilled birth attendance and treatment of pneumonia, can efficaciously address the causes of death of mothers and children. We see that while the utilization of skilled birth attendance has increased from 37.07 to 43.48 from 1998 to 1993, utilization by those belonging to the lowest deciles of 15.14 to 17.89 for 1998 and 1993, respectively, are way below the national average. Diagnoses and treatment for pneumonia becomes possible as children with fever are brought to providers for treatment. Rates of seeking treatment for fever are also lower for the first quintile relative to the rest of the population. Health system factors at the local level partly contribute to patterns of inequitable utilization of services and health outcomes. Examples of these factors include the absence of doctors in several municipalities and variations in provider quality measured on structural or process dimensions (Capuno and Kraft 2009). Financing constraints likewise contribute. The low percentage share of social health insurance in health care financing implies that the poor are not yet protected from impoverishing catastrophic health payments (PHNA 2006). Out-of-pocket payments (OOP) costs and susceptibility to poverty from catastrophic costs vary across regions (Ico 2008).

In the education sector, the access to or completion of primary education remains less than universal with significant regional and socioeconomic dimensions (Manasan 2000, Mesa 2008, Maligalig and Albert 2008). According to DepEd, during the academic year 2007–08, still about one in five among 6–11 year old children did not enroll, and only about three in five of those who started their elementary schooling finished the

required six years. Moreover, most of those who stay on until Grade VI, especially in public schools, do not perform passably enough in mathematics, science, English and other core subjects included in the National Achievement Test. The figures for the previous academic years are not any better.

Despite free primary education in public schools, still a disproportionate number of children from the poor households do not enroll or drop out from school. Based on an official survey in 2007, there are about 20 children 6–11 years old in the poorest income decile that are not attending school for each one in the richest income decile. For these out-of-school children, the most commonly cited reasons are lack of personal interest (18%), employment/looking for work (13.44%), and high cost of education (15.03%). Interestingly, 33.7 percent cited "too young to go to school" despite the fact that six years old is official age of entry to primary school. These reasons suggest that both choice and circumstance factors influence household schooling decisions. These factors would include household income, quality of public schools and local government support to education. Thus, an assessment of the possible effect of school improvement under the BESRA on enrollment could help refine policy.

The estimation of the effects of policy variables on access to health care and primary education is the main objective of this paper. To tease out the effects, we apply logit regression analysis on official household survey data for 2003 and 2007. In the analysis, we further emphasize the relative importance of choice and circumstance factors. We focus on two circumstance variables, namely Philhealth coverage and location. The Philhealth coverage is a social health insurance program for all Filipinos and which the government extends for free to identified indigent population. Location of

household residence is supposed to capture all area-specific characteristics such as the accessibility or quality of public health and education services in the community. We assume location to be exogenous since household migration decisions are more likely to be influenced by employment prospects and the costs of migration, and that households are not easily excluded from local public services in places where them may chose to migrate. Our findings confirm the importance of household factors, such as income, mother's education, family composition and child characteristics to health seeking and schooling decisions. Moreover, we also find that Philhealth improves both decisions, while location has variable effects on equity of access to health and education services. The implication is that supply-side interventions alone may not reduce inequities in access, while targeted demand-side interventions will.

The rest of the paper is organized as follows. Section 2 presents the methodology for the analysis of household health seeking and schooling decisions and the simulation of impacts of policy variables on household decisions and on overall equity of access to public services. The methodology is the applied on the survey data described in section 3. The regression and simulation results on health and education are taken up in sections 4 and 5, respectively. The last section contains the conclusions and policy implications.

2. Empirical framework

This section presents the two-step procedure used to identify the choice and circumstance variables that determine household decisions to seek health care or attend schools, and to simulate the equity impact of policies that influence the circumstance factor that households face. The circumstance variables of interest are the public services

available to households, including social health insurance coverage. However, only community-level data on public services are available. To get around the data and estimation problems, we adapt here a two-step procedure suggested in O'Donnel et al. (2008). In the first step, we estimate a logit model of household decisionmaking with community fixed effects. In the next step, we regressed the community fixed effects against community-level variables, including those directly affected by policies. We then plugged the partial effects of the policy variables obtained in the second step into the logit model estimated in the first step to simulate the policy impact on household decisions, and on equity of access.

The principal equity indicators used are the Equity Index of Opportunity (EIO) and Opportunity Index (OI), and the opportunity curves discussed in Ali and Son (2007) and Son (2009) (Appendix 1). The baseline estimates of EIO and OI are based on the predicted outcomes (say, use of health facility or school attendance) obtained form the first step. In the second step, predicted of outcomes corresponding to a policy scenario are obtained and then used to calculate the new EIOs and OIs. The difference between the old and new EIOs and OIs will indicate the policy's effect on overall equity.

To fix ideas, consider the following logit regression model (Greene 2003) adopted to identify the factors that influence household decision-making,

$$\text{Prob}(Y_i = 1 \mid \mathbf{X}_i, \mathbf{P}_i) = e^{(\alpha + \mathbf{X}_i'\boldsymbol{\beta} + \mathbf{P}_i'\boldsymbol{\delta})} / 1 + e^{(\alpha + \mathbf{X}_i'\boldsymbol{\beta} + \mathbf{P}_i'\boldsymbol{\delta})} \qquad (1)$$

where *i* refers to the *i*th child or mother, *Y* is the outcome (say, school attendance), ***X*** is vector of child and household characteristics, including household income per capita, and **P** is vector of provincial dummy variables, α is the intercept and $\boldsymbol{\beta}$ and $\boldsymbol{\delta}$ are vectors of

regression coefficients. From (1), each child would then have a predicted probability of schooling. They can also be arranged in terms of increasing income, i.e.,

$$\hat{Y}_1 \leq \hat{Y}_2 \leq \hat{Y}_3 \leq ... \leq \hat{Y}_N \qquad (2)$$

where $\hat{Y}_1$ is the predicted probability of schooling of the child with the lowest household income per capita, $\hat{Y}_2$ is the predicted probability of schooling of the child with the second to the lowest household income per capita, so forth and so on. These predicted probabilities are then used to compute for the baseline EIO and OI.

From (1), the marginal effect on *Y* of a particular provincial dummy variable, say P_j, is estimated as follows:

$$\hat{\delta}_j = \text{Prob}(Y = 1 \mid \overline{\mathbf{X}}, P_j = 1) \quad - \text{Prob}(Y = 1 \mid \overline{\mathbf{X}}, P_j = 0) \qquad (3)$$

where $\overline{\mathbf{X}}$ is a vector of the mean values of the child and household characteristics. Note that since the marginal effect would be the same for all children that live in the same province, then the total number of marginal effects would be equal to the number of provinces, say, *J*.

The next step is to link the provincial marginal effects to province-level policy variable, *I*, and other factors, say *Z*. For example, the marginal probability of school attendance would be influenced by the local government's education expenditures per pupil (policy variable) and the average family income in the province. Suppose that such a relationship exists and is linear, as given below:

$$\hat{\delta}_j = \alpha_0 + \alpha_1 I_j + \mathbf{Z}'_j \boldsymbol{\alpha}_{\mathbf{z}} + \varepsilon_j \qquad (4)$$

where the α's are regression coefficients and ε is the error term. Suppose further that the government sets the desired policy to I^* in province *j*. Then its adoption would induce a change in the marginal effects equal to $\Delta\hat{\delta}_j = \hat{\alpha}_1(I^* - I_j)$.

Given the parameter estimates in (1), plugging in $\Delta\hat{\delta}_j$ yields the new predicted probability of schooling for the *i*th child in province *j*, $\hat{Y}_{ij}^*$,

$$\text{Prob}(Y_{ij} = 1 \mid \mathbf{X}_{ij}, \mathbf{P}_{ij}) = e^{(\alpha + \mathbf{X}_{ij}\hat{\boldsymbol{\beta}} + \mathbf{P}_j'(\hat{\boldsymbol{\delta}}_j + \Delta\hat{\boldsymbol{\delta}}_j))} / 1 + e^{(\alpha + \mathbf{X}_{ij}\hat{\boldsymbol{\beta}} + \mathbf{P}_j'(\hat{\boldsymbol{\delta}}_j + \Delta\hat{\boldsymbol{\delta}}_j))} = \hat{Y}_{ij}^* \qquad (5)$$

If the same policy *I** is adopted in all provinces, then (5) yields a new estimate of the probability of, say, schooling for each child, i.e., $\hat{Y}_{ij}^*$, $\forall i$ and $\forall j$. Together with their corresponding new estimates of probabilities induced by the new policy (*I**), these children can then be arrayed as well in ascending order of per capita income as in (2):

$$\hat{Y}_1^* \leq \hat{Y}_2^* \leq \hat{Y}_3^* \leq \ldots \leq \hat{Y}_N^* \qquad (6)$$

where $\hat{Y}_i^*$ is the new predicted probability of schooling of the *i*th child. These new predicted probabilities can then be used to calculate the equity index of opportunity corresponding to *I**. The difference in the EIOs obtained using (2) and (6) yields a measure of the equity impact of the policy change.

3. Data

In the analyses of household decisions concerning health and schooling, the two main survey datasets used are the 2003 National Demographic and Health Survey (NDHS) and the 2007 Annual Poverty Indicators Survey (APIS). Both are undertaken by the National

Statistic Office, and have regionally-representative samples of 14,000 and 52,000 households, respectively. The NDHS contains information obtained from women of reproductive age concerning maternal and child health, reproductive health practices, health care utilization and others. The APIS provides information on different indicators related to poverty, including demographic and economic characteristics of the family, health status and education of family members, housing, water and sanitation conditions of the family, and income and expenditures. Additional administrative data are culled from the DOH, DepEd and other national government agencies..

To assess the role of various factors in the use of health care services, we use the women's and children's samples from the 2003 NDHS. We linked these individual samples with the household characteristics obtained from the household module and the characteristics of pertinent household members, i.e., the parents and partners, where available. Our two main regressands are categorical variables, the first one takes on a value of one when a woman's last delivery was attended by a doctor, nurse or midwife, and the other also takes on a value of one when treatment was sought for children 0–5 years with fever. We regressed both categorical variables against individual, household, and area variables that represent the need, costs and benefits of utilization, as well as indicators of household efficiency in health production. Among the individual variables included are the age and sex of the mother and/or child, to proxy for their health stock. The employment characteristics of those who may have some influence on utilization, i.e., the parents in the case of children's health care utilization and the partner in the case of women's utilization, are included to represent the ability to earn income as well as indicators of the opportunity costs of time of the household members. The educational

characteristics of the decision makers, as well as their knowledge of treatment alternatives are also included to represent their preferences toward health as well as how efficiently they can produce health using health inputs We also included variables on household composition that represent the opportunity costs of time that could serve as barriers or support to utilization. We also included dummy variables for wealth deciles to represent the capacity to pay of households for care. A binary variable that takes on a value of one when any member of the household is a Philhealth member, either as regular or indigent member, is included to gauge whether insurance serves to alleviate the out-of-pocket costs of health services.

Ideally, other aspects of supply and demand, as they are faced by the household, should be included among the determinants of utilization. These include, among others, the prices of the services, the distance to the health care facility, and the availability and quality of both public and private providers. To represent these circumstances, we use variables that take on a value of one when the individual belongs to the particular province. The estimated coefficients of these province variables represent the collective effect of area characteristics on utilization aside from the individual and household characteristics included in the regression. These represent the impacts of the circumstances of the families' location on their health care use.

To decompose the effects of these circumstance variables, we regress the estimated marginal effects on variables such as the municipal and provincial spending on health, nutrition, and population, to represent the salaries and wages of personnel the materials, and the commodities purchased by the local government unit (LGU)for its facilities. Alternatively, we include either the ratio or number of government health personnel

(doctor, barangay health workers, or midwives) to represent the availability of public providers. The number of barangay health stations, government and private hospitals, in both numbers and ratio to population are included to represent the availability of facilities that are proximate to the residence of the households. Private sector hospitals and beds also serve as indicators of the presence of private providers. We also include the availability of accredited facilities, both rural health units and hospitals, to represent not just the availability of providers of certain minimum quality but also assurance that Philhealth benefits can be accessed by the population. These variables are represented as either counts of municipalities with accredited facilities or ratios relative to the number of municipalities. Table 1 and Table 2 contain the descriptive statistics of the health-related household variables used.

[Insert Table 1 and Table 2 here.]

In the analysis of household schooling decisions, we limited the sample to households with children 6–11 years old. In the Philippines, a child who is six years old is expected to commence elementary education at Grade I and then complete it by finishing Grade VI. The total number of children in this age group is 28,505. Table 3 show the descriptive statistics of the variables used in the analysis of schooling decision. The main dependent variable is inschool, which is equal to one if the child is currently attending school and zero if not. About 94 percent of the sample children are in school. There are three sets of regressors. The first set are binary variables that pertain to the child's characteristics, namely member_male (1 if male and 0 otherwise), member_age (age in years), ill_disabled (1 if ill or disabled and 0 otherwise), relation to the household head (child or grandchild). About half of the samples are male. The mean age is 8.5 years.

About 22.7 percent was ill or had injury. About 84 percent were children of the household heads, and 13.6 percent were grandchildren.

[Insert Table 3]

The second set of variables pertains to the socioeconomic and demographic characteristics of the household, including that of the head. Of the household heads, about 88 percent of were male (head_male), approximately 90 percent were married (head_married) or had work during the last six months (head_work), and nearly 41 percent finished at least high school education (head_highschool). The households are further classified in terms of income per capita deciles, homeownership status (owner), status of insurance coverage with Philhealth, and the proportion of household members 15 years old and younger in total family size (members 15 yrs old). The left out decile is the richest (10^{th}). Of the total sample, roughly 39 percent had Philhealth coverage. The average share of minors (15 years old and below) is roughly half of the total family size. About 67 percent owned the house and lot they lived in.

The last set of regressors comprises area dummy variables, one each for the 80 provinces and two cities included in the APIS dataset. The base province is the National Capital Region (NCR), which comprises 17cities and municipalities in Metro Manila. In reality, these 17 local government units are independent and they do not belong to any province. However, excluding them in the sample would bias the result considering that NCR residents account for over ten percent of the country's entire population.

The variables used in the province-level regressions are defined and statistically described in Table 5. The dependent variable (Mfx_province), with a mean of –0.0109, is the marginal effects of the area dummy variables obtained from the logit analysis of

household schooling decision. The explanatory variables are school characteristics, local government expenditures, and measures of household poverty. Due to lack of more recent data, the school-level data used here are for 2004. For the 71 provinces in the sample, the mean proportion of principal-led public elementary schools in the province is 18.84. The average numbers of pupils is 34.80 per room, 1.18 per seat, 32.33 per chair, 4.05 per desk and 34.14 per teacher for all public elementary schools in the sample provinces. The average expenditure of the local governments in the province (i.e., provincial, municipal and city governments) is 2,052 pesos per person. However, their combined education expenditures, based on their School Education Fund (SEF) distributed to local public schools, amounted to only 32.42 pesos per pupil, on average. The average poverty incidence rate and poverty severity were about 32 percent and 3.18 percent, respectively.

[Insert Table 4 here.]

4. Improvements in health opportunities

Table 5 shows the marginal effects from logit estimates of likelihood of having a skilled birth attendant at delivery. The role of knowledge and information is underscored by our results that show that the years of education of the mother are significant in explaining the likelihood to avail of delivery attended by a doctor, nurse or midwife. At ten years of education (equivalent to about high school level), skilled birth attendance increase by 30 percentage points. These imply that policies targeted at providing information on the risks of childbearing should be targeted toward those who have less years of schooling.

[Insert Table 5 here.]

The number of prenatal visits in turn is significant in explaining the likelihood of having skilled birth attendance. This is consistent with the finding that ANC visits are crucial in checking up on the progress of the pregnancy, on having needed immunizations like tetanus toxoid and determining whether the pregnancy is a high-risk one that may require the expertise of skilled birth attendants and complicated delivery services (e.g., ceasarian sections). These imply that information campaigns about pregnancy include not just an emphasis on the delivery aspects but also the before-delivery phases.

The demands of household management and child care are significant household constraints to a mother's utilization of services. If the woman is the wife of the household head, the less likely is she to have skilled birth-attended delivery. The presence of children under 5 years old in the household reduces the likelihood of having skilled-birth attendance. Mothers with young children may not want to be away from the house for a long time after delivery since there would be no one to care for the young children. These are consistent with observations that women prefer traditional birth attendants because of the extra services that they provide, i.e., cleaning, cooking, and taking care of children after delivery of the mother. The suggestions to partner with traditional birth attendants, wherein they would form part of women's health teams and be designated to provide the household care services to the mother, in efforts to encourage skilled-birth delivery may thus work. Alternatively, programs may be initiated where mothers can plan ahead for their birth, including arrangements for child care.

The result that the number of children under 5 years old in the household leads to less likelihood of seeking maternal care services can partially support the contention that birth spacing can have significant maternal health implications. Aside from the

physiological aspect of letting the mother recover from childbirth, birth spacing can induce utilization of needed services through its role in alleviating the burden of child care for children under 5 years.

Constraints on the financing side are likewise significant in explaining the likelihood to use care, with households belonging to lower income deciles having lower likelihood of skilled birth attendance. These factors seem to be the most significant constraints, accounting for about 18 to 50 percentage point reductions in the likelihood of having skilled birth attendance relative to the highest income decile. However, the presence of a family member who is a Philhealth member partially mitigates against this constraint as it contributes to about six percentage points increase in the likelihood of seeking care. Expansion of insurance coverage, especially under the Philhealth's Sponsored Program for those in the lower income deciles, could therefore increase the probability of those groups in utilizing maternal health care services.

The marginal effects of the province dummy variables are significantly different from zero, implying that location specific barriers are influential in explaining outcomes. For skilled birth attendance (SBA), only about nine provinces have higher likelihood of utilization relative to NCR and the areas are near NCR (e.g., Rizal, Cavite, Bulacan). Most of these provinces are in Luzon. Thus, efforts aimed at increasing skilled birth attendance can focus on the Visayas and Mindanao areas.

Table 6 shows the ordinary least squares estimates of the impact of community characteristics on the province fixed effects for use of maternal health care services. The greater the physician to the population ratio, the higher is the likelihood of having skilled birth attendance. A higher density of doctors implies greater availability of government

providers who may be called upon to deliver babies, implying shorter waiting time. The higher the number of municipalities in the province with accredited hospitals, the higher is the likelihood of skilled birth attendance. These are intuitive as a higher density of doctors and accredited hospitals in the respective municipalities may imply shorter time to travel to providers and the facilities where benefits can be accessed. These are especially imperative for complicated deliveries where emergency facilities with the requisite manpower should be within reach within 30 minutes to 2 hours from the home of the mother (DOH 2008). This underlies the importance of not only increasing coverage by Philhealth but also of having accessible facilities (i.e., within the municipality) where pregnant women can avail themselves of their Philhealth benefits. This implies that to increase the use of services, increasing Philhealth coverage should be coupled with steps to ensure that facilities are accredited.

[Insert Table 6 here.]

Equity of policy scenarios for maternal and child care

For skilled birth attendance, four simulations were performed: (i) full coverage of the bottom 40 percent in Philhealth; (ii) ensuring that all pregnant women have at least four ANC visits; (iii) increasing the doctor to population ratio to reach mean levels, or the equivalent of one doctor per about 27,000 population; and (iv) increasing the number of hospitals such that two thirds of the municipalities in the province have an accredited hospital. The results for skilled-birth attendance reveal that ensuring that all pregnant women have at least four ANC visits and increasing the number of municipalities with accredited hospitals increase the OI and generate larger upward shifts in the opportunity curves (Figure 1). These two interventions also generate the larger increase in the EIO,

signifying movements toward a more equitable distribution, even if the EIOs are still below one. These imply that information on the risks of complicated pregnancies and consequences of unsafe deliveries that could be given during ANC visits may convince mothers of the need to have skilled birth attendance in facilities.

[Insert Figure 1 and Table 7 here.]

When it comes to seeking care for fever, the age of the child is a more significant consideration (Table 8). Older children are less likely to be brought for care in the case of fever. Children whose mothers are allowed to make decisions about seeking treatment are more likely brought to health providers. This implies that household decision-making relationships matter, especially in the care of children. Philhealth membership of any member in the household is significant in explaining the decision to seek care for fever. This may be in consideration that the child may be referred to the hospital for treatment of fever, in which case insurance coverage can reduce the out-of-pocket expenses. Only those from deciles 1 and 3 are less likely to seek care. However, Philhealth membership can partly mitigate these reductions.

[Insert Table 8 here.]

The province variables are also significant in explaining the likelihood to use child health care services. However, it seems that children belonging to other provinces aside from the NCR are more likely to seek care for fever while only about 14 provinces show lower rates of utilization. There does not seem to be a pattern of likelihood of care increasing with income of province, therefore pointing to some other factors that may account for the discrepancy. For instance, those showing the least likelihood of seeking care and the greatest likelihood relative to NCR both belong to the Cordillera

Administrative Region. This indicates that even between regions, provincial variations in utilization exist.

For seeking care for fever, provinces with higher numbers of government hospitals to population and with higher numbers of municipalities with accredited hospitals have higher likelihood of seeking care for fever (Table 9). However, the more private hospitals to population, the lower the likelihood of seeking care for fever. These trends seem to point to the importance of financial considerations in seeking care. Government hospitals are usually cheaper than private hospitals. Thus, the more government hospitals there are, the higher the likelihood that sick children can be admitted in less expensive facilities. The presence of government hospitals can also be a countervailing factor to higher prices of private hospitals, hence the positive effect on care seeking. The greater the number of municipalities with accredited hospitals, the higher the likelihood of seeking care. This has implications on the access to benefits of Philhealth. Not only should the population be covered, the facilities where they can access these services should be present as well. Thus, Philhealth membership should not only be encouraged, efforts should be made toward ensuring that accredited facilities are also present in the municipalities.

[Insert Table 9 here.]

The simulation results for seeking care for fever in children reinforce the notion that ensuring households in Philhealth should be coupled with ensuring that households can access these benefits (Table 10). The estimated opportunity curves for accredited hospitals and Philhealth coverage result in nearly equal opportunity indices (Figure 2). However, the opportunities associated with increasing the count of accredited hospitals

are higher for the higher income deciles such that the opportunity curve is steeper than that of Philhealth coverage. As far as seeking care for children is concerned, increasing the government hospital to population ratio improves the opportunities for everybody but does not favor the poor in particular. This confirms the notion that the recipients of subsidies from government hospitals may not always be the poor.

[Insert Table 10 and Figure 2 here.]

5. Improvements in education opportunities

Inequities in school attendance could be due to several factors, both within and without the control of households. Table 11 shows the child-level and household-level variables that have statistically significant marginal effects on the school attendance of 6–11 year old children are the child's gender, age and relation to the household head, the household head's completion of at least high school, the household's income status and age-composition, and Philhealth insurance coverage. Relative to female child, a male child is about a percentage point less likely to attend school. The child's likelihood of attending school improves by about one percentage point as he or she grows older. A child or a grandchild of the household head also has slightly better chances (1–2 percentage points) of being in school than other children in the household.

[Insert Table 11 here.]

In addition, a child in a household whose head finished at least high school has a small edge (2.6 percentage points) when compared to another who lives in household with less educated head. Household composition also seems to matter. In particular, child in a household with high proportion of minors (15 years old and younger) is nearly two

percentage points less likely to be in school than another who live in a household with fewer children competing over the family's education budget. Finally, school attendance is about 1.8 percentage points higher for a household with Philhealth coverage than another without similar insurance coverage, but lower by about 4.6 percentage points for some of the poor households (i.e., those in the third income deciles) than those in the richest income decile.

Higher school attendance among female children is consistent with findings about rural families in the Philippines where the parents bequeath land to male children and education to female children (Estudillo, Quisumbing and Otsuka 2001). Perhaps, the same parental preference could explain why direct descendants (children or grandchildren) are more likely to be in school. The lower school attendance among the low-income households or those with many school-age members is consistent with the view that such households may have less savings or resources for education (Orbeta 2009). However, the financial burden of education seems alleviated by Philhealth coverage, perhaps indirectly by freeing up precautionary savings that now partly go for school expenses (Capuno, Quimbo, Tan and Kraft 2009).

Of the 77 provinces and cities, 36 of them had negative, statistically significant marginal effects, while 27 had positive, statistically significant marginal effects, and the rest (14) had no statistically detectable marginal effects. Of the 36 provinces and cities where school attendance was significantly less likely than in the NCR, the areas with the lowest marginal probabilities are Lanao del Sur (–0.18), Sulu (–0.15), Maguindanao (–0.12), Tawi-Tawi (–0.10), Isabela City (–0.07), Zamboanga del Norte (–0.04), Sultan Kudarat (–0.4), Bukidnon (–0.04), and Cotabato City (–0.04). All of these provinces and

cities are found in the southern island of Mindanao, and six belong to the conflict-ridden area of Autonomous Region of Muslim Mindanao where most social and economic indicators are worst in the country.

While NCR is the richest provinces, the fact that its rate of school attendance is unlike that in most provinces or cities indicate the presence in these areas of both facilitating and hindering environmental factors that influence household decisions. Of these factors, the government directly controls the proximity or quality of public schools, peace and order, or the local government support to local schools (principally, the Special Education Fund) or directly to children (like scholarships).The government also regulates tuition fees in private schools and corporate sponsorships of education activities. By tweaking these community-level or environmental factors, the government can then influence the circumstance variables that have direct bearing on household's schooling decisions.

Equity of policy scenarios for school attendance

Following the methodology outlined in section 2, the estimated coefficients of the provincial dummies in the logit regression of school attendance (Table 11) are regressed using OLS against province-level average school-level inputs, local government expenditures (total and on education), and poverty incidence or severity (to account for the general socioeconomic conditions of the population in the provinces). Table 12 shows the statistically significant factors: principal (0.0006), pupils per seat (–0.0324), and poverty severity (–0.0053). The signs of the coefficients are as expected since arguably children are more enticed to go to class if each is assured of a seat (lower pupils per seat ratio), and the general community is well off (which also imply that other children are also in school). Note that it is the severity of poverty (how poor a household is) rather

than its mere incidence (whether the household is poor) that ostensibly matters. This implies that the extremely poor households are unable to access public education services. Finally, the province-level fixed effects are also positively influenced by the proportion of principal-led schools, which could mean that principals are better at managing schools, inspiring the teaching staff, and engaging the local community for the benefit of the school.

[Insert Table 12 here.]

Given the OLS results, three policy scenarios are simulated for 2007. First, the average proportion of principal-led public elementary schools in each province is pegged to no less than 20 per cent. Second, the average number of pupil per seat in all public elementary schools in each province is set to no more than one. A combination of the first and second policy scenarios constitutes the third. In 2007, 58 provinces also had more than one pupil per seat, and 46 provinces had less than 20 per cent of the schools run by principals. Targeting at least 20 per cent of the schools to have principals (rather than teachers) as school heads seems conservative since there is dearth of qualified principals.

Table 13 shows the OIs and EOIs corresponding to the three policy scenarios. Obtained sans the assumed policy changes, the baseline EIO is 0.9845. The first policy scenario – that of adjusting the number of pupils per seat – is leads to an EIO of 0.9847, which is a slight improvement over the baseline EIO. However, the resulting EIO is 0.9840 for the second policy scenario – that of raising the proportion of principal-led schools. A combination of the two policy scenarios yields an EIO of 0.9842. These results indicate that while the three policy scenarios each can improve the rate of attendance in public schools in each province, only the first one (pupils per seat not more

than one) can improve overall equity. In contrast, increasing the proportion of school-led principals is increase seem to worsen equity, which means it could induce higher enrollment among all children but perhaps slightly more of them from high-income families. This can be inferred from Figure 3 where the opportunity curves corresponding to each of the policy scenarios are higher than although somewhat parallel the baseline's.

[Insert Table 13 here and Figure 3 here.]

In sum, the policy simulation exercises here show how selected policy variables can improve overall rate of school attendance, but not necessarily the overall equity. Put differently, school-based or supply-based interventions benefit all and do not discriminate in favor of the poor households. Alternatively, the government thus has to resort to demand-side interventions to get the children from poor households to school.

6. Conclusion

In summary, we find both choice and circumstance factors to be relevant in explaining household decisions to seek care for their members or to send their children to school. Particularly at the household level, lack of income and capacity to pay, family composition, mother's age and education status, and the child's age and gender are found critical. These results are broadly consistent with those found in other studies (e.g., Orbeta 2009, Mesa 2008, Son 2009, Son and San Andres 2009), which also reported significant spatial variations in household access to health or education services.

In this paper, we investigated further the differential effects of several area-level characteristics that are captured together with others as part of location fixed effects in usual regression analyses of household decisions. Applying a two-step procedure, we are able to tease out the impact of province-level health and education service variables on

the probability of skilled-birth attendance, seeking care for fever in children and elementary schooling. The presence of accredited facilities, the number of health personnel, the type of school resources available, and local government support to the public schools in the community help define the circumstances that condition household decisions. Another circumstance variable we considered in Philhealth coverage, which the government automatically extends to poor households... Our simulation results reveal that Philhealth coverage has bigger impact than facility-based circumstance factors in improving overall equity of access to health services. In addition, we find that while school-level factors may improve overall enrollment, the impact is less felt among the poor.

The results have two major policy implications. The first policy implication is that demand side interventions, especially when targeted to the poor like Philhealth coverage, will improve overall health access and its equity. It may also induce greater school participation. The second policy implication is that while location-specific barriers may be capturing the inadequate levels, distribution or qualities public health facilities or schools, it is still important to tease out the relative effectiveness of the components of a possible supply-side intervention. For example, doctors may be important than the health facility per se to pregnant mothers. In education, principals may be more critical than chairs or desks in improving scholastic achievements. Thus, the impact of demand-side interventions can be maximized if supply-constraints are likewise addressed.

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Appendix 1. Equity Index of Opportunity[2]

Suppose there are *n* persons in a society with economic welfare levels $x_1, x_2, \ldots\ldots, x_n$, where the person with economic welfare x_1 is the poorest person and the person with economic welfare x_n is the richest person. Economic welfare can be measured either by expenditure or income (per capita). Let y_i be the probability that the *i*th individual is able to utilize a service when and if needed. The utilization of the service is defined to be equitable if the poor have a higher probability of utilizing the service than the non-poor. Following this definition, a service is equitable (inequitable) if y_i decreases (increases) monotonically with *i*: the poorer (richer) an individual, the greater (smaller) the probability of utilization.

Suppose the economic welfare *x* of an individual is a random variable with probability density function *f*(x) and *y*(*x*) is the probability of opportunity to access a service by an individual with economic welfare *x*, then the average opportunity enjoyed by the whole population is given by

$$\bar{y} = \int_0^\infty y(x) f(x) dx \qquad (1)$$

Government policy should be to expand the opportunities available to society. In an ideal situation where everyone in society has access to a service, $\bar{y}$ will be equal to 100. The main drawback of this measure is that it is completely insensitive to the distribution of opportunities across individuals with different levels of economic welfare. Ali and Son (2007) have proposed an opportunity index that takes into account not only average opportunities available to the society but also how the opportunities are distributed across the individuals. This index gives the largest weight to the poorest person in society, and the weight decreases as the economic welfare increases. Suppose $\bar{y}(x)$ is the average opportunity enjoyed by individuals who have income less than *x*, then their opportunity index is given by

$$\bar{y}^* = \int_0^\infty \bar{y}(x) f(x) dx \qquad (2)$$

The greater $\bar{y}^*$ is, the greater will be the opportunities available to the population. The government policy should be to maximize the value of $\bar{y}^*$. If everyone in the population enjoys exactly the same opportunity in terms of accessing a service, then it can be shown that $\bar{y}^*$ will be equal to $\bar{y}$. Thus, the deviation of $\bar{y}^*$ from $\bar{y}$ indicates how opportunities are distributed across the population. If $\bar{y}^*$ is greater than $\bar{y}$, then opportunities are equitably distributed, i.e., pro-poor. In a similar manner, if $\bar{y}^*$ is less than $\bar{y}$, opportunities are inequitably distributed, i.e., anti-poor. This leads to an equity index of opportunities (EIO) proposed by Ali and Son (2007):

$$\varphi = \frac{\bar{y}^*}{\bar{y}} \qquad (3)$$

which implies that opportunities are equitable (inequitable) if φ is greater (less) than 1.

[2] The text is lifted from Son (2009) with minor editing.

Table 1. Descriptive Statistics, Skilled Birth Attendance

Variable	Obs	Mean	Std. Dev.	Min	Max
Skilled Birth Attendance	4680	0.5882	0.4922	0	1
Delivery in a Facility	4680	0.3731	0.4837	0	1
At least 4 Antenatal Care Visits	4680	0.7017	0.4576	0	1
Rural	4680	0.5318	0.499	0	1
Age of Woman	4680	30.3135	6.8473	15	49
Years of education of woman	4680	9.0115	3.9532	0	17
Woman is wife of household head	4680	0.8028	0.3979	0	1
Years of education of husband	4680	8.6556	4.4669	0	98
Husband is a professional	4680	0.11	0.313	0	1
Age of husband	4680	33.4024	7.9211	16	79
Woman works in agriculture	4680	0.0521	0.2223	0	1
Woman is engaged in paid work	4680	0.3628	0.4809	0	1
Number of children under 5 years	4680	1.6449	0.838	0	9
Number of household members	4680	6.0515	2.41	1	22
Any household member a PHIC member	4680	0.2893	0.4535	0	1
Wealth Decile 1	4680	0.1263	0.3322	0	1
Wealth Decile 2	4680	0.1226	0.3281	0	1
Wealth Decile 3	4680	0.1158	0.32	0	1
Wealth Decile 4	4680	0.1032	0.3043	0	1
Wealth Decile 5	4680	0.1013	0.3017	0	1
Wealth Decile 6	4680	0.0966	0.2954	0	1
Wealth Decile 7	4680	0.0853	0.2793	0	1
Wealth Decile 8	4680	0.0859	0.2802	0	1
Wealth Decile 9	4680	0.0885	0.284	0	1
Wealth Decile 10	4680	0.0746	0.2627	0	1
NCR	4680	0.1335	0.3402	0	1
Abra	4680	0.0062	0.0785	0	1
Agusan del norte	4680	0.0124	0.1106	0	1
Agusan del sur	4680	0.0141	0.1179	0	1
Aklan	4680	0.0041	0.0636	0	1
Albay	4680	0.013	0.1134	0	1
Antique	4680	0.0026	0.0506	0	1
Basilan	4680	0.003	0.0546	0	1
Bataan	4680	0.0066	0.0811	0	1
Batangas	4680	0.0135	0.1153	0	1
Benguet	4680	0.0132	0.1143	0	1
Bohol	4680	0.0098	0.0987	0	1
Bukidnon	4680	0.015	0.1214	0	1
Bulacan	4680	0.0229	0.1495	0	1
Cagayan	4680	0.0171	0.1296	0	1
Camarines norte	4680	0.0056	0.0743	0	1
Camarines sur	4680	0.0214	0.1446	0	1
Camiguin	4680	0.0017	0.0413	0	1
Capiz	4680	0.0075	0.0862	0	1

Variable	Obs.	Mean	Std. dev.	Min.	Max.
Catanduanes	4680	0.0028	0.0526	0	1
Cavite	4680	0.0229	0.1495	0	1
Cebu	4680	0.0393	0.1944	0	1
Davao del norte	4680	0.0081	0.0898	0	1
Davao del sur	4680	0.0278	0.1644	0	1
Davao oriental	4680	0.0051	0.0714	0	1
Eastern samar	4680	0.0092	0.0954	0	1
Ifugao	4680	0.0032	0.0565	0	1
Ilocos norte	4680	0.0053	0.0729	0	1
Ilocos sur	4680	0.006	0.0771	0	1
Iloilo	4680	0.0179	0.1328	0	1
Isabela	4680	0.019	0.1366	0	1
Kalinga	4680	0.006	0.0771	0	1
La Union	4680	0.0062	0.0785	0	1
Laguna	4680	0.0212	0.1439	0	1
Lanao del Norte	4680	0.0098	0.0987	0	1
Lanao del Sur	4680	0.0113	0.1058	0	1
Leyte	4680	0.0197	0.1388	0	1
Maguindanao	4680	0.0173	0.1304	0	1
Marinduque	4680	0.003	0.0546	0	1
Masbate	4680	0.0096	0.0976	0	1
Misamis Occidental	4680	0.006	0.0771	0	1
Misamis Oriental	4680	0.0152	0.1222	0	1
Mountain Province	4680	0.0032	0.0565	0	1
Negros Occidental	4680	0.0231	0.1502	0	1
Negros Oriental	4680	0.0115	0.1068	0	1
Cotabato (north)	4680	0.0147	0.1205	0	1
Northern Samar	4680	0.0051	0.0714	0	1
Nueva Ecija	4680	0.0173	0.1304	0	1
Nueva Vizcaya	4680	0.0045	0.0668	0	1
Occidental Mindoro	4680	0.0058	0.0757	0	1
Oriental Mindoro	4680	0.0109	0.1038	0	1
Palawan	4680	0.0203	0.141	0	1
Pampanga	4680	0.013	0.1134	0	1
Pangasinan	4680	0.0271	0.1625	0	1
Quezon	4680	0.0105	0.1018	0	1
Quirino	4680	0.0038	0.0619	0	1
Rizal	4680	0.0226	0.1488	0	1
Romblon	4680	0.0047	0.0684	0	1
Samar (western)	4680	0.0107	0.1028	0	1
Siquijor	4680	0.0015	0.0386	0	1
Sorsogon	4680	0.0077	0.0874	0	1
South Cotabato	4680	0.0246	0.1548	0	1
Southern Leyte	4680	0.0053	0.0729	0	1
Sultan Kudarat	4680	0.0096	0.0976	0	1
Sulu	4680	0.0143	0.1188	0	1
Surigao del Norte	4680	0.009	0.0943	0	1

Variable	Obs.	Mean	Std. Dev.	Min.	Max
Surigao del Sur	4680	0.0098	0.0987	0	1
Tarlac	4680	0.0064	0.0798	0	1
Tawi-Tawi	4680	0.0075	0.0862	0	1
Zambales	4680	0.006	0.0771	0	1
Zamboanga del Norte	4680	0.0162	0.1264	0	1
Zamboanga del Sur	4680	0.0231	0.1502	0	1
Aurora	4680	0.0021	0.0462	0	1
Biliran	4680	0.003	0.0546	0	1
Guimaras	4680	0.0028	0.0526	0	1
Sarangani	4680	0.0073	0.0849	0	1
Apayao	4680	0.0043	0.0652	0	1
Compostella Valley	4680	0.0064	0.0798	0	1
Zamboanga Sibugay	4680	0.006	0.0771	0	1
Isabela City	4680	0.0028	0.0526	0	1
Cotabato City	4680	0.0004	0.0207	0	1

Table 2. Descriptive Statistics, Seeking Care for Fever in Children

Variable	Obs	Mean	Std. Dev.	Min	Max
Seeking care for fever in children	2508	0.4386	0.4963	0	1
Rural	2508	0.5726	0.4948	0	1
Age of child in years	2508	1.8226	1.364	0	4
Female child	2508	0.4888	0.5	0	1
Age of mother	2508	29.8752	6.668	15	48
Years of education of mother	2508	8.5694	3.8476	0	17
Years of education of partner	2508	8.3896	5.3928	0	98
Partner is a professional	2508	0.0913	0.2881	0	1
Number of household members	2508	6.2707	2.4488	2	19
Number of children under 5 years old	2508	1.8676	0.8883	0	9
Any household member is PHIC member	2508	0.2891	0.4534	0	1
Mother can decide about seeking treatment	2508	0.9203	0.271	0	1
Wealth Decile 1	2508	0.1507	0.3578	0	1
Wealth Decile 2	2508	0.1427	0.3499	0	1
Wealth Decile 3	2508	0.134	0.3407	0	1
Wealth Decile 4	2508	0.1164	0.3208	0	1
Wealth Decile 5	2508	0.1073	0.3095	0	1
Wealth Decile 6	2508	0.0841	0.2776	0	1
Wealth Decile 7	2508	0.0706	0.2562	0	1
Wealth Decile 8	2508	0.0766	0.2659	0	1
Wealth Decile 9	2508	0.0658	0.248	0	1
Wealth Decile 10	2508	0.0518	0.2217	0	1
NCR	2508	0.0933	0.2909	0	1
Abra	2508	0.0088	0.0933	0	1
Agusan del norte	2508	0.0171	0.1298	0	1
Agusan del sur	2508	0.0239	0.1528	0	1
Aklan	2508	0.008	0.089	0	1
Albay	2508	0.0144	0.119	0	1
Antique	2508	0.0024	0.0489	0	1
Basilan	2508	0.0044	0.0661	0	1
Bataan	2508	0.0044	0.0661	0	1
Batangas	2508	0.0132	0.114	0	1
Benguet	2508	0.0144	0.119	0	1
Bohol	2508	0.0088	0.0933	0	1
Bukidnon	2508	0.0187	0.1356	0	1
Bulacan	2508	0.0243	0.1541	0	1
Cagayan	2508	0.0112	0.1051	0	1
Camarines norte	2508	0.0088	0.0933	0	1
Camarines sur	2508	0.0231	0.1503	0	1
Camiguin	2508	0.0012	0.0346	0	1
Capiz	2508	0.0108	0.1032	0	1
Catanduanes	2508	0.0032	0.0564	0	1
Cavite	2508	0.0235	0.1516	0	1

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Cebu	2508	0.0443	0.2057	0	1
Davao del norte	2508	0.01	0.0994	0	1
Davao del sur	2508	0.0347	0.183	0	1
Davao oriental	2508	0.0068	0.0821	0	1
Eastern samar	2508	0.0096	0.0974	0	1
Ifugao	2508	0.004	0.063	0	1
Ilocos norte	2508	0.004	0.063	0	1
Ilocos sur	2508	0.0068	0.0821	0	1
Iloilo	2508	0.0243	0.1541	0	1
Isabela	2508	0.01	0.0994	0	1
Kalinga	2508	0.006	0.0771	0	1
La Union	2508	0.0056	0.0745	0	1
Laguna	2508	0.0187	0.1356	0	1
Lanao del Norte	2508	0.0096	0.0974	0	1
Lanao del Sur	2508	0.0084	0.0911	0	1
Leyte	2508	0.0239	0.1528	0	1
Maguindanao	2508	0.0152	0.1222	0	1
Marinduque	2508	0.0028	0.0528	0	1
Masbate	2508	0.0116	0.1069	0	1
Misamis Occidental	2508	0.008	0.089	0	1
Misamis Oriental	2508	0.0219	0.1465	0	1
Mountain Province	2508	0.0056	0.0745	0	1
Negros Occidental	2508	0.0287	0.167	0	1
Negros Oriental	2508	0.0144	0.119	0	1
Cotabato (north)	2508	0.012	0.1087	0	1
Northern Samar	2508	0.0032	0.0564	0	1
Nueva Ecija	2508	0.0152	0.1222	0	1
Nueva Vizcaya	2508	0.0068	0.0821	0	1
Occidental Mindoro	2508	0.0068	0.0821	0	1
Oriental Mindoro	2508	0.0116	0.1069	0	1
Palawan	2508	0.0339	0.181	0	1
Pampanga	2508	0.0052	0.0718	0	1
Pangasinan	2508	0.0191	0.137	0	1
Quezon	2508	0.0076	0.0867	0	1
Quirino	2508	0.006	0.0771	0	1
Rizal	2508	0.0116	0.1069	0	1
Romblon	2508	0.0088	0.0933	0	1
Samar (western)	2508	0.0116	0.1069	0	1
Siquijor	2508	0.0016	0.0399	0	1
Sorsogon	2508	0.008	0.089	0	1
South Cotabato	2508	0.0263	0.1601	0	1
Southern Leyte	2508	0.0064	0.0796	0	1
Sultan Kudarat	2508	0.0104	0.1013	0	1
Sulu	2508	0.0148	0.1206	0	1
Surigao del Norte	2508	0.0136	0.1157	0	1
Surigao del Sur	2508	0.0144	0.119	0	1

Variable	Obs	Mean	Std. Dev	Min.	Max
Tarlac	2508	0.004	0.063	0	1
Tawi-Tawi	2508	0.0044	0.0661	0	1
Zambales	2508	0.0028	0.0528	0	1
Zamboanga del Norte	2508	0.01	0.0994	0	1
Zamboanga del Sur	2508	0.0171	0.1298	0	1
Aurora	2508	0.0024	0.0489	0	1
Biliran	2508	0.004	0.063	0	1
Guimaras	2508	0.0024	0.0489	0	1
Sarangani	2508	0.006	0.0771	0	1
Apayao	2508	0.0044	0.0661	0	1
Compostella Valley	2508	0.0076	0.0867	0	1
Zamboanga Sibugay	2508	0.0048	0.069	0	1
Isabela City	2508	0.0036	0.0598	0	1

Table 3. Descriptive Statistics (School attendance of 6–11 years old, 2007)

Variable	Obs	Mean	Std. Dev.	Min	Max
Inschool	28505	0.9403263	0.2368855	0	1
Member_male	28505	0.5144361	0.4998003	0	1
Member_age	28505	8.526259	1.688238	6	11
Ill_disabled	28505	0.2266269	0.4186565	0	1
Child	28505	0.835678	0.3705741	0	1
Grandchild	28505	0.1364673	0.3432901	0	1
Head_male	28505	0.8834941	0.3208362	0	1
Head_married	28505	0.9043677	0.2940915	0	1
Head_highschool	28505	0.4059639	0.4910862	0	1
Head_work	28505	0.899351	0.3008687	0	1
Income Decile 1	28505	0.1363971	0.3432158	0	1
Income Decile 2	28505	0.1355201	0.3422842	0	1
Income Decile 3	28505	0.1323978	0.3389287	0	1
Income Decile 4	28505	0.1319418	0.3384334	0	1
Income Decile 5	28505	0.1220137	0.3273074	0	1
Income Decile 6	28505	0.0956674	0.2941398	0	1
Income Decile 7	28505	0.0833889	0.276474	0	1
Income Decile 8	28505	0.0701631	0.2554262	0	1
Income Decile 9	28505	0.0526574	0.2233526	0	1
Owner	28505	0.6726539	0.469253	0	1
Philhealth covered	28505	0.3929135	0.4884064	0	1
Members 15 yrs old	28505	0.5161087	0.1530269	0.083	0.875
Abra	28505	0.0054727	0.0737764	0	1
Agusan del Norte	28505	0.0125943	0.1115173	0	1
Agusan del Sur	28505	0.0131556	0.1139428	0	1
Aklan	28505	0.0039642	0.0628382	0	1
Albay	28505	0.0129451	0.1130397	0	1
Antique	28505	0.0038239	0.0617204	0	1
Basilan	28505	0.0026662	0.0515673	0	1
Bataan	28505	0.0046658	0.0681487	0	1
Batanes	28505	0.0005262	0.0229339	0	1
Batangas	28505	0.0181723	0.1335764	0	1
Benguet	28505	0.0139975	0.1174823	0	1
Bohol	28505	0.0108402	0.1035523	0	1
Bukidnon	28505	0.0129451	0.1130397	0	1
Bulacan	28505	0.0211191	0.1437839	0	1
Cagayan	28505	0.015471	0.1234186	0	1
Camarines Norte	28505	0.0067357	0.0817956	0	1
Camarines Sur	28505	0.0216804	0.1456403	0	1
Camiguin	28505	0.0016488	0.0405731	0	1
Capiz	28505	0.0089458	0.0941599	0	1
Catanduanes	28505	0.0029118	0.0538831	0	1
Cavite	28505	0.0213647	0.1445993	0	1
Cebu	28505	0.0397825	0.1954512	0	1
Davao del Norte	28505	0.0106297	0.1025529	0	1
Davao del Sur	28505	0.0262761	0.159958	0	1
Davao Oriental	28505	0.0065252	0.080516	0	1
Eastern Samar	28505	0.0079986	0.089078	0	1
Ifugao	28505	0.0047009	0.0684032	0	1
Ilocos Norte	28505	0.0062796	0.0789961	0	1
Ilocos Sur	28505	0.0070865	0.0838839	0	1
Iloilo	28505	0.021926	0.1464445	0	1
Isabela	28505	0.0201719	0.1405905	0	1
Kalinga	28505	0.007297	0.0851115	0	1
La Union	28505	0.0077179	0.0875137	0	1
Laguna	28505	0.0163129	0.1266782	0	1
Lanao del Norte	28505	0.0100684	0.0998368	0	1
Lanao del Sur	28505	0.0121733	0.109661	0	1
Leyte	28505	0.0239607	0.1529294	0	1
Maguindanao	28505	0.0173654	0.1306308	0	1

Variable	Obs	Mean	Std. Dev.	Min	Max
Marinduque	28505	0.0046658	0.0681487	0	1
Masbate	28505	0.0113313	0.1058458	0	1
Misamis Occ.	28505	0.0075776	0.0867206	0	1
Misamis Oriental	28505	0.0152605	0.1225893	0	1
Mt. Provinces	28505	0.0052622	0.0723514	0	1
Negros Occidental	28505	0.02582	0.1586009	0	1
Negros Oriental	28505	0.0114366	0.1063306	0	1
North Cotabato	28505	0.0161375	0.1260066	0	1
Northern Samar	28505	0.0076829	0.0873161	0	1
Nueva Ecija	28505	0.0157516	0.1245153	0	1
Nueva Vizcaya	28505	0.0054727	0.0737764	0	1
Occ. Mindoro	28505	0.0092265	0.0956119	0	1
Oriental Mindoro	28505	0.0131556	0.1139428	0	1
Palawan	28505	0.0174355	0.1308898	0	1
Pampanga	28505	0.0187336	0.1355849	0	1
Pangasinan	28505	0.0331872	0.1791282	0	1
Quezon	28505	0.0176109	0.1315348	0	1
Quirino	28505	0.0024557	0.0494951	0	1
Rizal	28505	0.0170847	0.1295894	0	1
Romblon	28505	0.0064199	0.0798682	0	1
Samar	28505	0.0110507	0.1045417	0	1
Siquijor	28505	0.0009472	0.0307626	0	1
Sorsogon	28505	0.0119979	0.1088777	0	1
South Cotabato	28505	0.0194703	0.1381732	0	1
Southern Leyte	28505	0.0044203	0.0663392	0	1
Sultan Kudarat	28505	0.0078583	0.0882994	0	1
Sulu	28505	0.0172601	0.1302414	0	1
Surigao del Norte	28505	0.0091212	0.0950701	0	1
Surigao del Sur	28505	0.0129802	0.1131907	0	1
Tarlac	28505	0.0100333	0.0996645	0	1
Tawi-Tawi	28505	0.0049816	0.0704055	0	1
Zambales	28505	0.0049465	0.0701584	0	1
Zamboanga del Norte	28505	0.0168041	0.128539	0	1
Zamboanga del Sur	28505	0.0192598	0.1374391	0	1
Aurora	28505	0.0019646	0.0442807	0	1
Biliran	28505	0.0037186	0.0608683	0	1
Guimaras	28505	0.0017541	0.0418457	0	1
Sarangani	28505	0.0069461	0.0830551	0	1
Apayao	28505	0.0029118	0.0538831	0	1
Compostella Valley	28505	0.0067357	0.0817956	0	1
Zamboanga Sibugay	28505	0.0048413	0.0694117	0	1
Isabela City	28505	0.001298	0.0360053	0	1
Cotabato City	28505	0.0024908	0.0498465	0	1

Source: *Annual Poverty Indicators Survey*. Authors' own estimates.

Table 4. Variable definition and descriptive statistics (Marginal effects of provincial dummy variables, 2007)*

Variable	Definition	No	Mean	Std. Dev.	Min.	Max.
Mfx_province	Marginal effects of provincial dummy var.	71	-0.109	0.04	-0.18	0.02
Principal	Proportion of principal-led public elementary schools in the province	71	18.84	10.55	0.00	50.94
Pupils _room	Average number of pupils per room	71	34.80	7.96	22.09	69.64
Pupils _chair	Average number of pupils per chair	71	32.33	24.89	11.23	188.08
Pupils_seat	Average number of pupils per seat	71	1.18	0.31	0.78	2.65
Pupils_desk	Average number of pupils per desk	71	4.05	1.54	2.06	12.03
Pupils_teacher	Average number of pupils per teacher	71	34.14	5.98	22.59	52.36
LGU exp per capita	Total expenditures per capita of all local governments in the province	71	2052.30	819.00	1189.67	6456.86
LGU educ exp_pupil	Total School Education Fund per pupil of all local governments in the province	71	401.64	481.25	2.87	2880.81
Poverty incidence	Proportion of households who are poor in the province	71	32.42	17.68	1.20	88.8
Poverty severity	Severity of poverty among poor households in the province	71	3.18	3.05	0.00	17.8

*All variables are province-level estimates.
Source of data: Department of Education, Bureau of Local Government Finance and National Statistics Office.

Table 5. Marginal Effects after Logit, Skilled Birth Attendance

Variable	Skilled Birth Attendance	
	Marginal Effects	z
Rural	-0.1239*	-3.21
Age	0.0008	0.37
Years of education	0.0291*	6.64
Female is wife of household head	-0.0718*	-2.77
At least 4 antenatal care visits	0.1468*	6.02
Years of education of partner	0.0111*	2.2
Partner is a professional	0.0471	0.83
Age of partner	0.001	0.42
Woman is employed in agriculture	-0.0864	-1.63
Number of children under 5 years old	-0.0389*	-2.21
Number of household members	-0.0209*	-4.24
Any household member is PHIC member	0.0617*	2.52
Wealth decile 1	-0.5201*	-10.15
Wealth decile 2	-0.3957*	-6.19
Wealth decile 3	-0.3816*	-5.78
Wealth decile 4	-0.392*	-6.11
Wealth decile 5	-0.3358*	-4.72
Wealth decile 6	-0.3416*	-4.39
Wealth decile 7	-0.2539*	-3.45
Wealth decile 8	-0.1661*	-2.19
Wealth decile 9	-0.1845*	-2.28
Abra	-0.0413	-0.95
Agusan del Norte	-0.2629*	-8.88
Agusan del Sur	-0.3326*	-20.94
Aklan	-0.2124*	-4.97
Albay	-0.1712*	-5.19
Antique	-0.2747*	-7.76
Basilan	-0.3263*	-11.16
Bataan	0.1521*	20.72
Batangas	-0.2929*	-14.79
Benguet	-0.0447**	-1.84
Bohol	0.0113*	0.37
Bukidnon	-0.3714*	-14.32
Bulacan	0.1314*	16.83
Cagayan	-0.2517*	-7.74
Camarines Norte	-0.0099	-0.25
Camarines Sur	-0.1088*	-3.18
Camiguin	0.0441	1.21
Capiz	0.0131	0.37
Catanduanes	-0.3461*	-17.97
Cavite	0.0547*	6.04

Cebu	0.0040	0.23
Davao del Norte	-0.1715*	-6.39
Davao del Sur	-0.2041*	-11.13
Davao Oriental	-0.1572*	-5.13
Eastern Samar	-0.2024*	-6.48
Ifugao	0.2070*	6.25
Ilocos Norte	0.1150*	4.02
Ilocos Sur	-0.0407	-1.32
Iloilo	-0.2047*	-6.21
Isabela	-0.1454*	-4.20
Kalinga	-0.2531*	-6.79
La Union	-0.1693*	-4.94
Laguna	-0.0001	-0.01
Lanao del Norte	-0.2832*	-11.74
Lanao del Sur	-0.2430*	-6.59
Leyte	-0.1446*	-4.05
Maguindanao	-0.2478*	-6.27
Marinduque	-0.1501*	-3.59
Masbate	-0.2926*	-9.88
Misamis Occidental	-0.2746*	-8.48
Misamis Oriental	-0.2811*	-14.13
Mountain Province	0.0737*	2.01
Negros Occidental	-0.1012*	-4.12
Negros Oriental	-0.0211	-0.78
Northern Samar	-0.0671**	-1.72
Nueva Ecija	0.0809*	3.69
Nueva Vizcaya	-0.2717*	-11.01
Occidental Mindoro	-0.3433*	-16.14
Oriental Mindoro	-0.2002*	-6.47
Palawan	-0.4253*	-25.50
Pangasinan	0.0214	1.16
Quezon	-0.2223*	-6.11
Quirino	0.0606	1.62
Rizal	0.0223**	1.65
Romblon	-0.1693*	-5.28
Samar (Western)	-0.4621*	-22.24
Sorsogon	-0.0668**	-1.77
South Cotabato	-0.1853*	-8.34
Southern Leyte	-0.1976*	-5.31
Sultan Kudarat	-0.4140*	-21.65
Sulu	-0.5222*	-67.17
Surigao del Norte	-0.2194*	-8.21
Surigao del Sur	-0.3910*	-18.49
Tarlac	0.1182*	4.74
Tawi-Tawi	-0.3955*	-12.62
Zambales	0.0007	0.03
Zamboanga del Norte	-0.3366*	-10.90
Zamboanga del Sur	-0.3083*	-12.54
Zamboanga Sibugay	-0.0652**	-1.84
Aurora	-0.0649	-1.51

Biliran	-0.3105*	-20.17
Guimaras	-0.5500*	-56.48
Sarangani	-0.5180*	-65.31
Apayao	-0.4024*	-12.72
Compostella Valley	-0.4813*	-44.31
Isabela City	-0.5517*	-48.21
Cotabato	-0.2941*	-8.95
No. of observations	4610	
Pseudo *R*-squared	0.3418	

* Significant at the 5% level

** Significant at the 10% level

Source: Authors' own calculation based on NDHS 2003.

Table 6. Effects of Area Characteristics, Skilled Birth Attendance

Variable	Skilled Birth Attendance	
	Coefficients	T
Doctors to population	717.8619*	2.05
Midwife to population	151.8361	0.67
Government hospital bed to population	100.0149	1.21
Private hospital bed to population	-27.2324	-0.79
Number of municipalities with accredited RHU	0.0042	0.46
Number of municipalities with accredited hospitals	0.0133*	2.63
Constant	-0.4031	-5.78
No. of observations	77	
R-squared	0.1850	

* Significant at the 5% level

** Significant at the 10% level

Source: Authors' own calculation

Figure 1. Opportunity Curves for Skilled Birth Attendance

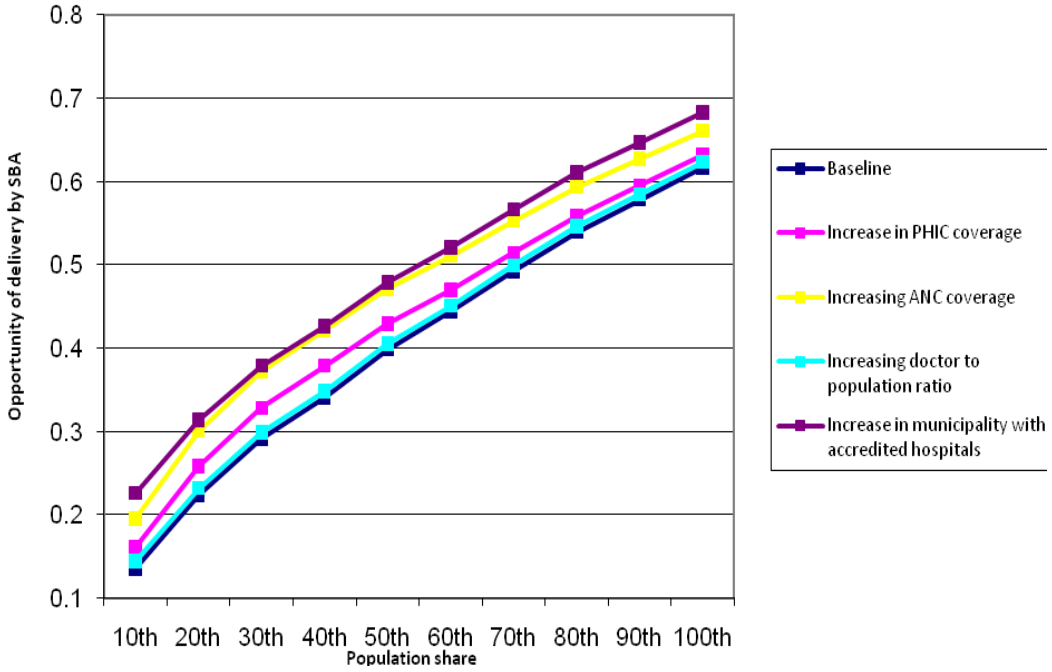

Table 7. Equity Effects of Policies, Skilled Birth Attendance

Policy	Skilled Birth Attendance	
	OI	EOI
Baseline	0.4061	0.6586
Increase in Philhealth coverage of bottom 40 %	0.4327	0.6847
Increasing ANC coverage to 100%	0.4708	0.7123
Increasing doctor to population ratio to reach mean levels	0.4135	0.6633
Increase to 2/3 the municipalities with accredited hospitals	0.4853	0.7103

Table 8. Marginal Effects, Seeking Care for Fever in Children

Variable	Seek Care for Fever- Children	
	Marginal Effects	z
Rural	-0.0377	-1.27
Age of child in years	-0.0337*	-3.94
Female child	0.0101	0.49
Age of mother	-0.0013	-0.58
Years of education of mother	-0.0004	-0.13
Years of education of partner	0.0058**	1.81
Partner is a professional	0.0188	0.47
Number of household members	-0.0058	-1.04
Number of children under 5 years old	-0.0041	-0.26
Any household member is PHIC member	0.0565**	1.78
Mother can decide about seeking treatment	0.0919*	2.12
Wealth decile 1	-0.1177*	-1.75
Wealth decile 2	-0.0981	-1.39
Wealth decile 3	-0.1427*	-2.16
Wealth decile 4	-0.0738	-1.01
Wealth decile 5	-0.0809	-1.17
Wealth decile 6	-0.0514	-0.65
Wealth decile 7	-0.0909	-1.61
Wealth decile 8	-0.0305	-0.43
Wealth decile 9	-0.1073**	-1.74
Abra	-0.0667*	-2.37
Agusan del Norte	-0.0612*	-2.13
Agusan del Sur	-0.0370	-1.3
Aklan	0.2207*	5.72
Albay	0.0506	1.61
Antique	0.3030*	8.43
Basilan	0.0887*	2.39
Bataan	0.2065*	14.03
Batangas	0.0677*	4.17
Benguet	0.0315*	2.88
Bohol	0.1229*	3.94
Bukidnon	0.2057*	6.73
Bulacan	0.0044	0.51
Cagayan	0.1713*	4.81
Camarines Norte	-0.0347	-0.83
Camarines Sur	-0.0992*	-4.12
Camiguin	-0.0991*	-3.18
Catanduanes	0.0946*	4.12
Cavite	0.1053*	11.38
Cebu	0.1016*	4.03
Davao del Norte	0.1050	5.2

Davao del Sur	-0.0714**	-3.69
Davao Oriental	0.1079	3.09
Eastern Samar	0.1244	3.05
Ifugao	0.3141	8.96
Ilocos Norte	0.0211*	0.85
Ilocos Sur	0.1822	6.14
Iloilo	-0.1273	-4.98
Isabela	0.1393	4.19
Kalinga	-0.3216	19.11
La Union	0.0862**	3.18
Laguna	0.1241	10.31
Lanao del Norte	-0.0401*	-1.65
Lanao del Sur	0.0492*	1.29
Leyte	0.3118	11.47
Maguindanao	0.0243*	0.54
Marinduque	-0.0468*	-1.37
Masbate	0.1086	2.54
Misamis Occidental	0.2233	7.26
Misamis Oriental	0.1697	7.16
Mountain Province	0.4105	18.97
Negros Occidental	0.2421	8.92
Negros Oriental	-0.0164*	-0.59
Northern Samar	0.3186	8.68
Nueva Ecija	0.1414	6.98
Nueva Vizcaya	-0.2183	14.61
Occidental Mindoro	0.0407*	1.11
Oriental Mindoro	0.0307*	1.05
Palawan	0.0028*	0.08
Pampanga	-0.0357*	-1.72
Pangasinan	0.0601**	3.21
Quezon	0.0399*	1.13
Quirino	-0.2588	11.93
Rizal	0.1654	10.09
Romblon	0.1584	4.33
Samar	0.0089*	0.21
Siquijor	0.1307	3.07
Sorsogon	0.1708	4.68
South Cotabato	0.0701**	3.58
Southern Leyte	0.0227*	0.57
Sultan Kudarat	-0.0840**	-2.45
Sulu	0.3010	10.55
Surigao del Norte	0.1441	4.82
Surigao del Sur	0.1372	4.26
Tarlac	-0.0024*	-0.08
Tawi-Tawi	0.3241	8.44
Zambales	-0.2470	18.39
Zamboanga del Norte	0.1306	3.19
Zamboanga del Sur	0.2049	6.86
Aurora	0.2168*	4.64
Biliran	-0.0024	-0.09

Guimaras	0.2993*	7.45
Sarangani	-0.0276	-0.93
Apayao	-0.1405*	-3.41
Compostella Valley	-0.0289	-0.9
Isabela City	-0.1078*	-4.25
Cotabato	0.0990*	2.52
No. of observations	2493	
Pseudo *R*-squared	0.0687	

* Significant at the 5% level

** Significant at the 10% level

Source: Authors' own calculation based on NDHS 2003

Table 9. Effects of Area Characteritsics, Seeking Care for Fever in Children

Variable	Seek Care for Fever- Children	
	Coefficients	*t*
Government hospital to population	5986.188**	1.71
Private hospital to population	-3119.812**	-1.98
Number of municipalities with accredited hospital	0.0059399**	1.82
Province and municipalities per capita health expenditures	-0.0002317	-1.14
Constant	0.0397579	0.76
No. of observations	75	
R-squared	0.1179	

* Significant at the 5% level

** Significant at the 10% level

Table 10. Equity Effects of Policies, Seeking Care for Fever in Children

Policy	Seek Care for Fever	
	OI	EOI
Baseline	0.4094	0.9111
Increase in Philhealth coverage of bottom 40 percent	0.4412	0.9463
Increase to 2/3 municipalities with accredited hospitals	0.4433	0.9259
Increasing the government hospital to population ratio to mean levels	0.4272	0.9137

Figure 2. Opportunity Curves for Seeking Treatment for Fever in Children

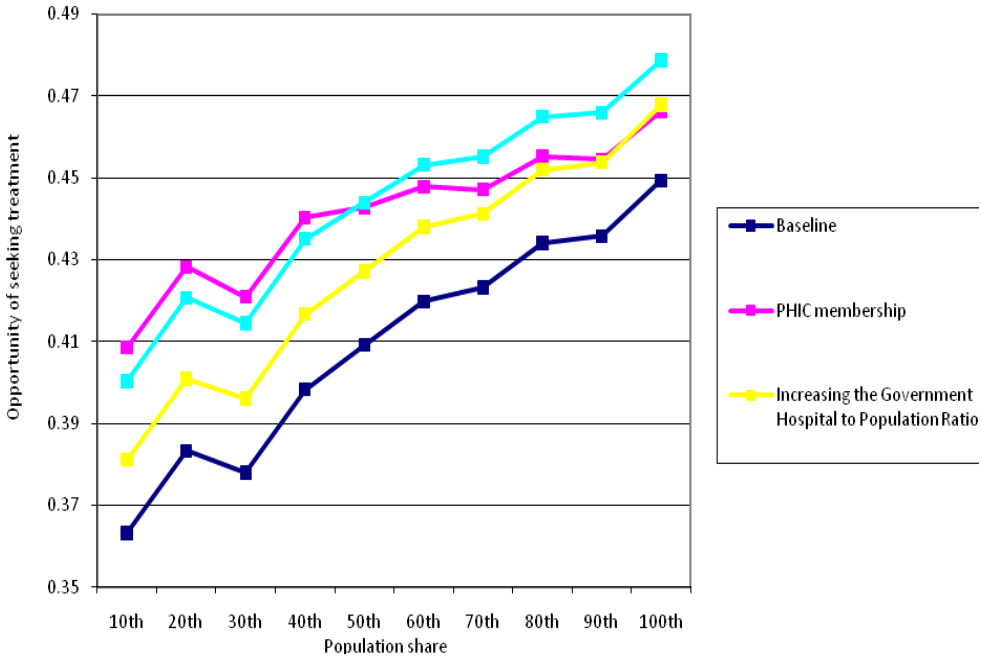

Table 11. Marginal Effects, School Attendance, 2007

	Marginal effects	*z*
Member_male	–0.008767***	–4.79
Member_age	0.0115061***	12.60
ill_disabled	–0.000069	–0.03
Child	0.023554**	2.37
Grandchild	0.0124163***	3.00
Head_male	–0.0056	–1.22
Head_married	0.0038012	0.70
Head_highschool	0.0267419***	10.7
Head_work	0.0040486	0.96
Decile 1	–0.041477	–1.62
Decile 2	–0.038264	–1.61
Decile 3	–0.046459*	–1.80
Decile 4	–0.034632	–1.58
Decile 5	–0.028344	–1.40
Decile 6	–0.015346	–0.86
Decile 7	–0.007383	–0.47
Decile 8	–0.000278	–0.02
Decile 9	0.0031138	0.29
Owner	0.0030195	1.35
Philhealth covered	0.0189722***	7.65
Members 15 yrs old	–0.019508***	–3.26
Abra	0.0246765***	21.82
Agusan del Norte	0.0019147	0.88
Agusan del Sur	–0.013952***	–3.71
Aklan	0.022971***	20.33
Albay	–0.006896**	–2.25
Antique	0.0044505*	1.84
Basilan	–0.005445	–1.48
Bataan	0.0231194***	19.93
Batangas	0.0111286***	6.22
Benguet	0.0159551***	9.35
Bohol	0.0036344	1.49
Bukidnon	–0.038599***	–5.46
Bulacan	0.0102732***	6.01
Cagayan	0.0065867***	3.06
Camarines Norte	–0.00523	–1.62
Camarines Sur	0.0049164**	2.21
Capiz	–0.034634***	–6.08
Catanduanes	–0.019231***	–4.11
Cavite	–0.015591***	–4.43
Cebu	–0.01205***	–3.35
Davao del Norte	–0.006351*	–1.91
Davao del Sur	–0.017671***	–4.46
Davao Oriental	–0.018263***	–4.11
Eastern Samar	0.0051091**	2.22
Ifugao	–0.028791***	–5.27
Ilocos Norte	0.0067018***	3.15
Ilocos Sur	0.0162714***	11.39
Iloilo	0.0088751***	4.59
Isabela	–0.010179***	–2.90

	Marginal effects	*z*
Kalinga	–0.002628	–0.87
La Union	0.0142396***	9.59
Laguna	0.010664***	6.30
Lanao del Norte	–0.017162***	–4.11
Lanao del Sur	–0.183954***	10.56
Leyte	–0.008631**	–2.76
Maguindanao	–0.11568***	–9.83
Marinduque	0.0015817	0.60
Masbate	0.0153192***	10.13
Misamis Occ.	–0.020388***	–4.71
Misamis Oriental	–0.004683	–1.59
Mt. Provinces	0.0151532***	9.30
Negros Occidental	–0.001228	–0.46
Negros Oriental	–0.032289***	–6.00
North Cotabato	–0.024038***	–4.95
Northern Samar	–0.036733***	–5.97
Nueva Ecija	0.0077597***	4.08
Nueva Vizcaya	–0.006649*	–1.83
Occ. Mindoro	–0.016529***	–4.07
Oriental Mindoro	0.0019121	0.80
Palawan	–0.031621***	–5.81
Pampanga	0.0012717	0.53
Pangasinan	0.0078273***	3.82
Quezon	–0.007445**	–2.34
Quirino	0.0148699***	9.31
Rizal	–0.010611***	–3.14
Romblon	0.0189615***	13.45
Samar	0.0132908***	8.75
Sorsogon	0.0021777	0.91
South Cotabato	0.0043538*	1.89
Southern Leyte	0.0176921***	14.48
Sultan Kudarat	–0.041067***	–6.33
Sulu	–0.153087***	–9.27
Surigao del Norte	0.0035678	1.50
Surigao del Sur	0.0013862	0.55
Tarlac	–0.014614***	–3.97
Tawi-Tawi	–0.095789***	–8.21
Zambales	0.0079359***	4.06
Zamboanga del Norte	–0.043947***	–7.02
Zamboanga del Sur	–0.017024***	–4.34
Aurora	–0.015293***	–4.57
Biliran	–0.007662***	–2.78
Sarangani	–0.027222***	–5.02
Apayao	0.017905***	12.09
Compostella Valley	0.001260	0.47
Zamboanga Sibugay	–0.025229***	–4.62
Isabela City	–0.072415***	–7.86
Cotabato City	–0.03688***	–6.63
No. of observations	32765	
Pseudo *R*-squared	0.2414	

Note: The provinces of Batanes, Camiguin, Siquijor and Guimaras are excluded because of collinearity.
***Siginificant at the 1% level.
**Signficant at the 5% level.
*Significant at the 10% level.
Source: *Annual Poverty Indicators Survey*. Authors' own computation.

Table 12. Effects of Area-level Characteristics, School Attendance
(OLS estimates)

Explanatory variables	Model 1		Model 2	
	Coefficient	Robust standard error	Coefficient	Robust standard error
Principal	0.0005*	0.0003	0.0006*	0.0003
Pupils _room	–0.0025	0.002	–0.0016	0.0017
Pupils _chair	–0.00009	0.0001	–0.0001	0.0001
Pupils_seat	–0.0295	0.0215	–0.0324*	0.0193
Pupils_desk	0.0015	0.0028	0.0012	0.0028
Pupils_teacher	0.0014	0.0019	0.0003	0.0015
LGU exp per capita	1.21e-06	1.84e–06	1.03e-06	2.40e-06
LGU educ exp_pupil	9.51e-06	9.62e-06	0.00001	9.43e-06
Poverty incidence	–0.0003	0.0003	0.0006	0.0004
Poverty severity			–0.0053*	0.0032
Constant	0.055**	0.0229	0.0516*	0.026
Number of observations	71		71	
F-statistic	5.09		4.71	
Prob>*F*	0.000		0.000	
R-squared	0.4881		0.5234	

Notes:
LGU = local government unit.
**Significant at the 5% level.
*Significant at the 10% level.
Sources: Department of Education, National Statistical Coordination Board and Bureau of Local Government Finance.
Authors' own estimates.

Table 13. Equity Effects of Policies, School Attendance

Policy scenarios	OI	EIO
Baseline	0.9366	0.9845
Pupil per seat (≤1)	0.9382	0.9847
Proportion of principal-led schools (≥ 20%)	0.9447	0.9840
All policy options	0.9464	0.9842

Source: Authors' own calculations.

Figure 3. Opportunity Curves for School Attendance