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The population-level impacts of a national health insurance program and franchise midwife clinics on achievement of prenatal and delivery care standards in the Philippines

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Abstract

Objectives—Adequate prenatal and delivery care are vital components of successful maternal health care provision. Starting in 1998, two programs were widely expanded in the Philippines: a national health insurance program (PhilHealth); and a donor-funded franchise of midwife clinics (Well-Family Midwife Clinics). This paper examines population-level impacts of these interventions on achievement of minimum standards for prenatal and delivery care.

Methods—Data from two waves of the Demographic and Health Surveys, conducted before (1998) and after (2003) scale up of the interventions, are employed in a pre/post study design, using longitudinal multivariate logistic and linear regression models.

Results—After controlling for demographic and socioeconomic characteristics, the PhilHealth insurance program scale up was associated with increased odds of receiving at least four prenatal visits (OR 1.04 [95% CI 1.01–1.06]) and receiving a visit during the first trimester of pregnancy (OR 1.03 [95% CI 1.01–1.06]). Exposure to midwife clinics was not associated with significant changes in achievement of prenatal care standards. While both programs were associated with slight increases in the odds of delivery in a health facility, these increases were not statistically significant.

Conclusions—These results suggest that expansion of an insurance program with accreditation standards was associated with increases in achievement of minimal standards for prenatal care among women in the Philippines.

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Keywords

maternal health; prenatal and delivery care; national health insurance program; social franchising; Philippines

1. Introduction

Worldwide, tens of thousands of women die each year from complications in childbirth, their deaths precipitated by conditions such as hemorrhage, sepsis, anemia, and hypertension; many more suffer maternal morbidity [1,2]. Ensuring the safety of motherhood is a consistent theme in recent global health policy discourse [3]. Set forth in 2000, the Millennium Development Goals (MDGs) provide the most visible framework for country-level resource allocation and prioritization in development policy. The MDGs have garnered attention and support for maternal health issues during a critical period in the development of the evolving health care delivery system in the Philippines [4,5].

Ensuring access to prenatal and delivery care is a vital and persistent concern in the Philippines. Despite improvements in maternal health over time, about 25% of women in the Philippines fail to meet the Department of Health's minimum standard of four prenatal visits, and less than half receive their first prenatal visit during the first trimester of pregnancy [6–8]. Many Filipina women give birth at home, and even as the number of health facilities has increased, less than half of births in the Philippines occur in health care facilities [9,10]. Adequate prenatal care and facility delivery may reduce the risk of adverse outcomes to women and infants during childbirth, particularly for complicated or high-risk pregnancies [11–14].

1.1. The National Health Insurance Program (PhilHealth)

The Philippine health system underwent major changes in the early 1990s, following decentralization of health sector management and service provision to the local level [15]. In 1995, the National Health Insurance Program (NHIP) of the Philippines was established, and a new government agency, the Philippine Health Insurance Corporation (PhilHealth), was subsequently created to administer the program. All retirees (government and private), government employees, and their dependents (spouse, children, and retired parents) became eligible for insurance coverage, and employer mandates ensured coverage for Filipinos working in the formal sector of the economy (those who receive a paycheck from an employer). A sponsored program to cover the poor (as determined by a means test by the Philippine government and implemented by the local government) and those working in the informal sector (those who work outside of the home, but do not receive a paycheck from a formal employer) have also been established.

PhilHealth is financed primarily through premium payments made by its members in the employed, self-paying, or sponsored sectors. In the employed sector, the premium contribution does not exceed 3% of the member's monthly salary and is shared equally by the member and the employer. For self-paying and sponsored members, the premium payment is 300 Philippine pesos (PHP) per quarter (US \$6), but local and national government contributions pay for the premiums of the sponsored members [16].

PhilHealth regional offices were established, starting in 1998, extending coverage to many parts of the country [16]. Use of insurance benefits increased dramatically soon afterward. Between 1998 and 2003, the number of claims paid by PhilHealth nearly quadrupled, increasing from 503,324 in 1998 to 1,831,786 in 2003 [17]. By 2003, nearly 70% of all Filipinos were eligible for health insurance benefits through PhilHealth, though not all were necessarily aware of their eligibility or able to access health services [5].

The number of PhilHealth-accredited facilities grew tenfold, from 150 in 1998 to over 1500 in 2003, tracking the scope of coverage expansion across the country [17]. PhilHealth accreditation is a voluntary process that can be undertaken by health care institutions and professionals. Applications for initial accreditation are submitted to the PhilHealth regional offices, which conduct inspection of all the health care institutions. The regional offices send the applications to the national PhilHealth offices for deliberation by the Accreditation Committee, which recommends approval or denial to the President of PhilHealth, who makes the final decision. Once granted, PhilHealth accreditation is valid for one year for institutions and three years for professionals, and renewal of accreditation is performed on an ongoing basis.

Both public and private health care institutions are accredited by PhilHealth, including primary, secondary, and tertiary care hospitals. In 2003, there were 1549 PhilHealth-accredited facilities throughout the country. Approximately 40% percent of these were public institutions, and 60% were privately-owned. One quarter of accredited facilities were located in urban areas, and three quarters were located in rural areas.

The NHIP includes a maternity benefit package as part of its coverage [5,18]. From 1998 until 2003, PhilHealth's maternal care coverage included reimbursement of health care providers for hospital delivery care (including caesarean births) and other inpatient services, including room and board, diagnostics, medicines, and physician and facility fees. This reimbursement covered many of the expenses of providing delivery services, so members with access to a PhilHealth-accredited hospital could receive these services free of charge or at a minimal cost. Between 1998 and 2002, the PhilHealth policy did not cover outpatient prenatal visits (an outpatient maternity benefit was introduced in 2003).

1.2. The Well-Family Midwife Clinics

A safe motherhood initiative financed by the United States Agency for International Development (USAID) and implemented by John Snow, Inc. (JSI) offered access to maternal care services through a franchise of Well-Family Midwife Clinics (WFMCs). The first WFMC opened in late 1997, and donor financing for the project ended in December 2004 [19]. The number of clinics in the country grew from about 80 clinics (primarily in and around metro Manila) in early 1998 to over 200 clinics at project close [20]. Beginning in 2002, WFMC midwives worked together with donors and program staff to establish the WFMC Partnership Foundation Inc (WPFI), which continues to organize and support midwives within the Well Family franchise.

Well-Family clinics use a uniform business model based on principles of commercial franchising. They provide a standardized set of services (family planning, maternity care, reproductive health services, and infant and child health care), but are independently owned and operated by individuals or groups of midwives [21,22]. Maternity care at WFMCs includes prenatal check-ups, labor and childbirth services, and post-partum visits [22]. Many WFMCs are accredited by PhilHealth, and as such, PhilHealth members who give birth at accredited WFMCs may have their deliveries covered by PhilHealth. All WFMCs also have designated referral facilities in the event of complications [19].

1.3. Program placement

Both the PhilHealth and WFMC programs tended to first establish themselves in places that were easy to reach and then, in addition, focus efforts on a set of regions that were particularly disadvantaged or high priority. PhilHealth tended to focus on program expansion and accreditation of facilities the northern part of the country, mountainous areas where transportation is difficult. A number of these regions have been designated by the Philippine

government as target development areas because of the extent of poverty and ill-health [23]. On the other hand, many WFMCs are located in the southern part of the Philippines (in and around the island of Mindanao), which also suffers considerable poverty. Much of this area has seen a surge of terrorism and anti-government activity in recent years, and quelling unrest in the area is a high priority for foreign donors. Further, the WFMC clinics were purposefully located in areas where their Filipino NGO and civil society partners had a strong presence [20,24].

1.4. Study objectives

The health insurance model implemented in the Philippines is common among both developed and developing countries [5], and accreditation processes to improve health care services delivery have also been widely adopted [25]. Additionally, many developing countries contend with the challenges of integrating donor-sponsored health projects like the WFMC franchise with government programs. Previous studies have often used descriptive narrative analyses or mathematical models rather than empirical analysis to describe the population-level economic or health impacts of donor programs or financing schemes in the wake of decentralization [15,19,26]. Little evidence is currently available to policy makers on the impacts of these efforts. Using longitudinal data from the Demographic and Health Surveys (DHS) in the Philippines, we examine the population-level impacts of the PhilHealth insurance program and the Well-Family Midwife Clinics on the achievement of minimum standards in prenatal and delivery care.

Our objective in this study is to determine whether there were improvements in attainment of maternal health care standards associated with the implementation of the PhilHealth and WFMC programs. Both programs aim to increase the provision of evidence-based maternal health services, but it is unclear whether potential benefits may be realized on a population level. Our population-level analysis does not focus on individual-level program exposure or clinical outcomes. Rather, this analysis aims to provide decision-makers with critical information about the impacts of widely-implemented programs across the target population as a whole.

2. Methods

This study uses longitudinal multivariate logistic and linear regression and data from two waves of the Demographic and Health Surveys (DHS) in the Philippines, conducted before (1998) and after (2003) expansion of the interventions. It employs a pre/post design that capitalizes on differences in intensity of program implementation across regions. Exposure to the two programs varied by region because of differences in the numbers of accredited facilities or established clinics, and thus regions with lower exposure to the PhilHealth or Well Family programs can serve as comparators for measuring program impact in regions with greater exposure.

In addition to empirical analysis of DHS data, in order to understand details of program implementation and interpret findings, we also conducted key informant interviews in January 2006 with a convenience sample of fifteen individuals who represent policy makers, donor organizations, government entities, health care providers, and program administrators. Each semi-structured in-depth interview was conducted in the key informant's place of employment, which included both Well Family Midwife Clinics and maternity wards at PhilHealth-accredited facilities.

2.1. Data sources

Data for this study come from the Demographic and Health Surveys (DHS) in the Philippines; these data are de-identified and publicly available. DHS surveys are highly standardized across countries and over time. The surveys use a multi-stage sampling design, which includes stratification by region and urbanicity, and clustering by local settlements (called barangays in the Philippines) [27]. We used recommended procedures to account for clustering and other survey design features in the analysis [28].

The DHS are conducted through in-person interviews, with multiple follow up visits as necessary. This study uses a subset of the data from the Philippine DHS individual-level survey, including information on background characteristics, reproductive history, prenatal and delivery care, and marriage. Three waves of the DHS have been conducted in the Philippines, in 1993, 1998, and 2003. The main analysis for this study was conducted using data from the 1998 and 2003 waves. Data from 1993 were unsuitable for the main analysis due to changes in regional designations in the Philippines that occurred in 1995 and 1997 [29], but were used to assess pre-intervention trends in the outcomes of interest. Response rates for the individual surveys were 98% in 1993, 97% in 1998, and 98% in 2003 [9,30,31]. For this study, the sample was limited to female survey respondents, ages 15–49, who reported giving birth at least once in the five years prior to being interviewed. The sample includes all survey respondents who meet these inclusion criteria. The DHS sampling weights were used to produce regionally and nationally representative estimates.

Data on the PhilHealth insurance program and the WFCMs came from publicly available program reports [16,17,19,20,32]; data from the Philippine National Census were used to quantify population and birth estimates as well as regional covariates [33].

2.2. Design of variables

Because the two health initiatives were not distributed equally throughout the Philippines, we used program presence in the region of residence of the survey respondent as a measure of intensity of exposure to the interventions at the regional level [34]. Specifically, we defined exposure as the number of PhilHealth accredited facilities or Well Family clinics per 10,000 births in a given region. Since regions vary greatly in population, we included this denominator to scale the number of facilities or clinics by a measure of the population eligible to use them. The exposure measures were constructed using data on the number of facilities in a region at the end of 2003 as the numerator and the reported number of births in each region in the 2003 Philippine Census as the denominator [17,20,35]. Table 1 shows the regional distribution of the number of PhilHealth facilities and Well Family clinics, as well as rates per 10,000 births, in 2003.

The primary outcomes of interest in this analysis are three indicators of achieving minimal standards for prenatal and delivery care based on recommendations from the Philippine Department of Health and the World Health Organization [36–40]. Based on a survey question about the number of prenatal visits prior to a woman's most recent delivery, we constructed an indicator for whether a woman had received at least four prenatal visits. Additionally, we used a question about the timing of the first prenatal visit to construct an indicator for whether a woman received her first prenatal visit prior to her fourth month of pregnancy (during the first trimester) [37]. The delivery standard of care is based on a woman's self report about whether her most recent delivery occurred in a health facility. Secondary outcomes include the total number of prenatal visits for the most recent delivery and, for those who delivered in a health facility, whether that delivery occurred in a public or private facility.

These outcomes are widely-used in both developed and developing country settings as markers of minimally adequate maternal health care [1,11,37,41]. Substantial evidence over the decades of DHS implementation supports the reliability and validity of these measures as used in DHS surveys [42,43]. In addition, we would have liked to look at access to skilled birth attendants (a widely-used maternal health indicator); however, the reliability of these measures may be questionable among respondents who have a difficult time distinguishing the skill levels and educational backgrounds of various types of midwives and birth attendants [44].

To account for the effects of variables known to be associated with prenatal and delivery outcomes and to decrease the potential impact of selection bias, several demographic, socioeconomic, and maternal health covariates were added to our multivariate models [45]. These covariates included age, years of education, marital status, religion, total number of live births, number of household members, age at first birth, urbanicity, and an index of assets. The index of assets is based on self-reported possession of electricity, radio, refrigerator, television, motorcycle, bicycle, and car/truck, and is constructed as the number of total assets owned.

In addition, we controlled for both the level and trend of development in each of the regions prior to program implementation. The regional covariates include median family income in 1997 and the percentage increase in average family income from 1994–1997. Data for these measures come from the annual Family Income and Expenditures Survey, which is part of the Philippines Census [46,47].

Several variables were created for use in stratified analyses. We created a categorical wealth variable, based on whether respondents' households had 0 or 1 assets, 2–3 assets, or 4 or more assets, which divided the population roughly into tertiles. Occupational status was created as an indicator for whether or not the respondent reported being employed.

2.3. Statistical Analysis

We used multivariate logistic and linear regression, weighted to account for survey design, to model changes from 1998 to 2003 in outcomes of interest, controlling for individual and regional level covariates. All analyses were conducted using SAS statistical software version 9.1.

To explore dose-response relationships between the study outcomes and the intensity of program exposure, we calculated quintiles of program exposure for both Well Family and PhilHealth, based on the proportions of the study population living in a region with a given exposure level. Predicted probabilities (Figure 1) were calculated using expected values generated by applying regression model coefficient estimates to the average individual and regional characteristics, such that the only factor that varied was the program quintile [48]. Relative percentage changes in predicted probabilities are based on the predicted differences between the first and fifth quintiles of exposure, as a proportion of the predicted probability for the first quintile.

For the multivariate analyses, we used a complete case approach. Fewer than 1% of observations were excluded due to missing data.

3. Results

3.1. Descriptive statistics

Table 2 shows average values and confidence intervals for key variables in the study population both before (1998) and after the expansion of the interventions (2003). On average, women in the study population were 30 years old and had nine years of formal education; they were 22 years old when their first child was born, had an average of three children, and lived in a 6-

person household. Approximately half of the study population lived in an urban area, 80% were Catholic, 5% were Muslim, and 95% were married. Covariates did not change appreciably over time, except for a small change in the distribution of assets, a slight increase in average years of education, and slight decreases in the total number of children ever born and the number of household members. These small changes were unlikely to impact results, but were tested for significance in the controlled regression models. Less than 1% of the individual level characteristics were missing in any given year.

All of the main study outcomes showed increases in the percentage of women receiving minimum standard care over time; however receiving the recommended number of prenatal visits was the only primary outcome that showed a statistically significant change over time in unadjusted pre-post comparisons (bottom of Table 2).

3.2. Estimated program impacts

The adjusted estimates of program impacts on the study outcomes are shown in Tables 3a and 3b. Each of the models represents one of the study outcomes, with primary outcomes (achievement of minimum care standards) shown in italics. Model 1 in Table 3a shows that an increase in the number of PhilHealth facilities per 10,000 births was associated with an increased chance of receiving four prenatal visits (OR 1.04 [95% CI 1.01–1.06]). In contrast, the availability of Well Family clinics was not associated with any change in this outcome. Other covariates that are positively associated with achieving this standard of care were age, years of education, living in an urban area, being married, and ownership of assets. The total number of children a woman had at the time of the interview was negatively associated with this outcome.

Model 2 in Table 3a shows that increased exposure to PhilHealth was also associated with increased odds of receiving a prenatal visit during the first trimester (OR 1.03 [95% CI 1.01–1.06]). Again, the availability of Well Family Clinics was not associated with a change in this outcome. Age, education, marriage, and wealth were all positively associated with receiving prenatal care in the first trimester, while the number of children, number of household members, and being Roman Catholic were negatively associated with this outcome.

Model 3 presents results of a linear regression model showing the impact of the PhilHealth and Well Family programs on the total number of prenatal visits. Both programs were associated with a statistically significant increase in the frequency of prenatal care among women in the study population.

In Table 3b, Model 4 shows the predicted program effects on the likelihood of delivery in a health care facility. While availability of both the PhilHealth and the Well Family programs were associated with slight increases in odds of facility delivery, these associations were not statistically significant. The positive predictors of facility delivery were age, urbanicity, educational attainment, and asset ownership. The negative predictors were total number of children and being Muslim.

Model 5 in Table 3b estimates program effects on the probability of delivery in a private facility among women who gave birth in a health care facility (n=3764), controlling for relevant covariates. The presence of Well Family Clinics was associated with increased odds of delivery in a private facility (OR 1.14 [95% CI 1.01–1.30]) vs. a public facility. The degree of exposure to the PhilHealth program did not have any effect on the likelihood of delivering in a private health care facility. More educated, urban, and wealthier women who delivered their babies in health care institutions had increased odds of using private rather than public facilities.

Figure 1 summarizes the impact of different degrees of implementation of the PhilHealth program on the achievement of maternal care standards. It displays the relative percentage change in the predicted probabilities of having achieved the three key study outcomes in 2003 compared to 1998 across quintiles of exposure to PhilHealth, holding all covariates constant at their average values in the post-policy period (as shown in Table 2).

Compared to 1998 rates and adjusting for all other variables, in the model, an increase from the lowest to the highest quintile of PhilHealth facilities per 10,000 births (representing the full range of program exposure) was associated with a 16% increase in the predicted probability of receiving at least four prenatal visits and a 30% increase in rates of prenatal care during the first trimester of pregnancy, but was not associated with a notable increase in rates of delivery in health facility. In contrast, across the range of exposure to the Well Family Clinics, there were no significant changes in the predicted probability of study outcomes (results not shown).

3.3. Stratified, subgroup, and pre-intervention trend analyses

We undertook several stratified analyses to examine the stability of results for main study outcomes by urbanicity, occupational status, and wealth tertile. The results of these analyses are presented in Table 4 and indicate that the impacts of the PhilHealth program on meeting minimum standards of prenatal care were strongest among women in rural areas, those in the lowest wealth tertile, and those who are employed.

For women living in regions without any Well Family Clinics, exposure to the PhilHealth program produced similar increases in the odds of meeting minimum standards of care as results for the entire sample. Furthermore, analyses excluding women living in the National Capital Region (the metro Manila area, which is predominantly urban and different from the rest of the country) also produced similar estimates of program impacts.

An analysis of regional-level pre-intervention trends, using data from the 1993 and 1998 DHS surveys in the Philippines, indicated that study outcomes were stable (neither increasing nor decreasing) between 1993 and 1998 for most regions, lending credence to our inference regarding measured responsiveness of study outcomes to program expansions between 1998 and 2003.

4. Discussion

These results suggest that the expansion of the PhilHealth insurance program was associated with increases in achievement of minimal standards for prenatal care among women in the Philippines. The presence of the Well Family Midwife Clinic program was not associated with significant changes in the odds of meeting prenatal care standards, but, like the PhilHealth program, was associated with an increase in the overall number of prenatal visits pregnant women received.

Potential reasons for the difference in effects between the two programs with respect to impacts on achievement of prenatal care standards may include differences in both program scale and substance. The Well Family Midwife Clinics, being a smaller-scale intervention, may not have reached sufficient numbers of women to create detectable changes in the achievement of care standards on a population level.

A national health insurance program that finances care and accredits health facilities may also more effectively target women receiving substandard maternal health care than a donor-funded franchise of private midwife clinics. Findings from our stratified analyses indicate that the PhilHealth program achieved the greatest increases in the chances of receiving minimum standard prenatal care among more vulnerable groups (poor and rural women). Also, the

PhilHealth program was particularly salient among employed women, as would be expected given the employer mandate in the structure of PhilHealth insurance coverage.

Women covered by PhilHealth insurance prior to 2003 may have had greater awareness of or more resources available for prenatal care as a result of their insurance coverage. In addition, they may be more likely to seek prenatal care due to implementation of accreditation standards, which may be associated with improvements in service provision and quality of care [25]. A recent study corroborates this idea, indicating that both national-level accreditation and insurance payments influence the quality of health care provision in the Philippines [49]. Hospital accreditation may improve the condition of facilities and the quality of care offered. Evidence indicates that accreditation processes generally have positive effects on service quality, operations, and service-related outcomes for the organizations that participate in accreditation [25]. However, without more information on the content of the additional and earlier prenatal visits that women appear to have received as a result of the PhilHealth coverage, it is difficult to fully understand the clinical impact of program expansion, but with more prenatal visits, there are certainly increased opportunities for appropriate screening, treatment, and education [50].

Neither the PhilHealth insurance program nor the Well Family clinics appeared to significantly increase the probability of delivery in a health facility. Prenatal health care seeking behaviors may be more amenable to change than the choice of delivery location, which is more deeply rooted in tradition and cultural norms [1,6,7,10]. In addition, challenges in obtaining transportation or child care may present obstacles to facility delivery which are not addressed by health insurance or midwife clinics. Delivery in a facility generally requires the mother to be away from home for several days, complicating her ability to secure extended child care for older children. Whereas prenatal care is often regularly scheduled and predictable, delivery care is more likely to be a sudden event and potentially less amenable to change due to the pregnant woman's reliance on other people (spouse, parents, extended family, neighbors) to facilitate her access to care. The groups for whom the PhilHealth program was effective in improving achievement of prenatal care standards (mostly poor and rural women) may be particularly sensitive to the logistical challenges of seeking delivery care in a health facility.

Since the Well Family Midwife Clinics are privately owned and operated, it is not surprising that their presence increased the odds of delivery in a private health care facility among women delivering in a health care institution. The PhilHealth program, which accredits both public and private facilities in approximately equal numbers (about 40% public and 60% private), was not associated with changes in public vs. private provision of delivery care.

While the overall levels of achievement of prenatal care standards were quite high and improved over time, the lack of program impact on delivery at a health facility was surprising [4,36]. Predicted probabilities of delivery in the health facility in 2003 were below 40%, even in urban areas (results not shown). Due to the limitations of the data, our study was not able to examine the role of costs as a barrier to facility-based delivery care.

This study is subject to a number of important limitations. We do not have individual-level data on insurance coverage or specific clinic usage for the women in our study. Exposure to the programs is measured on the regional level, and it is possible that there may be differences between regions that would contribute to the observed findings. We tried to minimize potential bias by including regional covariates for level and trend of development, and our results are further strengthened by evidence from our regional pre-intervention trends analysis.

It is not possible to rule out other factors as contributing causes for the changes in outcomes observed, especially given the time lag between DHS surveys. While these findings may be instructive in other country settings, results may not generalize beyond the Philippines. Finally,

the DHS data do not contain data that would allow the models to adjust for several factors that may influence prenatal and delivery care practices, such as income or health care costs [9].

5. Conclusions

The Philippine National Health Insurance Program and associated accreditation process was generally associated with significantly increased uptake of prenatal services and a positive impact on the achievement of minimally adequate prenatal care standards among Filipina women. A national social health insurance program that incorporates quality-based accreditation standards may be considered as one potential policy option for expanding access to prenatal health care services and increasing the achievement of standards of care in the provision of maternal health care.

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Note: Statistically significant increases are indicated by *. Results control for 1998 levels of study outcomes.

Figure 1.

Relative percentage change in the predicted probability of achieving maternal care standards in 2003 by degree of exposure to accredited PhilHealth facilities

Table 1

Regional distribution of the number of PhilHealth (PH) facilities and Well Family (WF) clinics, as well as rates per 10,000 births, in 2003.

Region	PH facilities	WF clinics	PH Facilities/10k births	WF Clinics/10k births
National Capital Region (NCR)	198	19	7.04	0.68
Cordillera Admin Region (CAR)	52	0	16.14	0.00
I - Ilocos	105	0	10.78	0.00
II - Cagayan Valley	56	0	9.50	0.00
III - Central Luzon	169	23	8.68	1.18
IV - Southern Tagalog [^]	227	12	8.10	0.43
V - Bicol	100	0	8.78	0.00
VI - Western Visayas	70	19	6.24	1.69
VII - Central Visayas	86	16	5.79	1.08
VIII - Eastern Visayas	63	4	11.01	0.70
IX - Zamboanga Peninsula	68	3	13.54	0.60
X - Northern Mindanao	107	17	15.07	2.39
XI - Davao	107	10	14.66	1.37
XII - Soccsksargen	89	15	17.78	3.00
XIII - Caraga	52	2	15.30	0.59
Autonomous Region in Muslim Mindanao (ARMM)	0	10	0.00	6.79
TOTAL	1549	150		

Note: Cells represent numbers of accredited PhilHealth facilities and Well Family Midwife Clinics in the regions in 2003 as well as the facility or clinic rate per 10,000 births. Data on births are taken from 2003 Philippine Census Data.

[^] The IV Southern Tagalog region was divided into IV-A Calabarzon and IV-B Mimaropa in May 2002; the 2003 data from these regions were re-aggregated to comprise IV Southern Tagalog.

Table 2
Characteristics of the study population before and after the interventions (1998 and 2003)

	Pre-intervention (1998) <i>n</i> =4968			Post-intervention (2003) <i>n</i> =4802		
	Mean	[95% CI]	Missing	Mean	[95% CI]	Missing
Covariates						
Age	30.37	[30.17–30.57]	0	30.24	[30.03–30.45]	0
Years of education [*]	8.69	[8.50–8.87]	0	9.16	[8.98–9.34]	0
Total children ever born [*]	3.48	[3.40–3.57]	0	3.29	[3.20–3.39]	0
Age at first birth	21.94	[21.78–22.11]	0	21.89	[21.74–22.05]	0
Number of household members [*]	6.34	[6.25–6.44]	0	6.06	[5.98–6.15]	0
Percentage urban	48%	[44%–52%]	0	51%	[47%–55%]	0
Percentage Catholic	80%	[79%–82%]	4	80%	[78%–82%]	5
Percentage Muslim	5%	[3%–6%]	4	5%	[3%–6%]	5
Percentage married	96%	[95%–96%]	0	95%	[95%–96%]	0
Percentage unemployed [*]	50%	[49%–52%]	0	53%	[51%–55%]	0
Bottom wealth tertile	34%	[31%–37%]	0	31%	[29%–33%]	0
Middle wealth tertile [*]	29%	[27%–31%]	0	34%	[32%–35%]	0
Top wealth tertile	37%	[34%–40%]	0	35%	[33%–37%]	0
Outcomes						
Received at least 4 prenatal visits [*]	64%	[62%–66%]	58	70%	[68%–72%]	51
First prenatal visit before 4th month	55%	[53%–57%]	423 [^]	56%	[54%–58%]	297 [^]
Number of prenatal visits	5.25	[5.08–5.42]	58	5.51	[5.37–5.65]	51
Gave birth in a health care facility	37%	[34%–40%]	12	40%	[38%–43%]	17
Gave birth in a private facility	16%	[15%–18%]	12	15%	[14%–17%]	17

Note: Figures presented are means or percentages and [95% confidence intervals]. Mean differences are measured by Wald Chi-squared tests, and

^{*} indicates *p*<0.05. Italicized outcomes represent achievement of a maternal health care standard.

[^] Missing values for this outcome represent about 8% of data in 1998 and 6% of data in 2003.

Table 3**Table 3a: Odds ratios from reduced form controlled logistic regression models, and coefficients for controlled linear regression models for prenatal outcomes**

	Model 1	Model 2	Model 3
	<i>At least 4 prenatal visits</i>	<i>First prenatal visit by month 4</i>	<i>Total number of prenatal visits</i>
PH facilities per 10k births in 2003	1.04 [1.01–1.06]**	1.03 [1.01–1.06]***	0.04 (0.01)**
WF clinics per 10k births in 2003	1.01 [0.95–1.08]	0.97 [0.91–1.04]	0.08(0.04)*
Age (in years)	1.04 [1.03–1.06]***	1.05 [1.03–1.07]***	0.06 (0.01)***
Education (in years)	1.11 [1.09–1.13]***	1.07 [1.06–1.09]***	0.20 (0.01)***
Total number of children	0.83 [0.79–0.87]***	0.84 [0.81–0.88]***	0.27 (0.03)***
Age when first child was born	0.99 [0.97–1.01]	1.00 [0.98–1.01]	−0.01 (0.01)
Number of household members	0.99 [0.97–1.01]	0.98 [0.96–1.00]*	−0.01 (0.02)
Urban (vs. Rural)	1.44 [1.26–1.65]***	1.07 [0.96–1.21]	0.49 (0.09)***
Catholic (vs. Protestant)	0.99 [0.86–1.14]	0.84 [0.73–0.96]**	−0.10 (0.10)
Muslim (vs. Protestant)	0.77 [0.57–1.05]~	0.78 [0.59–1.04]~	−0.46 (0.19)*
Married (vs. Unmarried)	1.78 [1.41–2.24]***	1.55 [1.23–1.97]***	0.86 (0.15)***
Assets index	1.21 [1.17–1.25]***	1.13 [1.10–1.17]***	0.30 (0.02)***
Regional level covariates included	yes	yes	yes

Table 3b: Odds ratios from reduced form controlled logistic regression models for the delivery outcomes

	Model 4	Model 5
	<i>Delivery in a health facility</i>	<i>Delivery in a private facility, conditional on delivery in a facility (n=3764)</i>
PH facilities per 10k births in 2003	1.00 [0.98–1.03]	1.00 [0.97–1.04]
WF clinics per 10k births in 2003	1.03 [0.96–1.11]	1.14 [1.01–1.30]*
Age (in years)	1.04 [1.02–1.06]***	1.02 [0.99–1.05]
Education (in years)	1.21 [1.18–1.23]***	1.14 [1.11–1.18]***
Total number of children	0.80 [0.75–0.85]***	0.92 [0.83–1.01]
Age when first child was born	1.01 [0.99–1.03]	1.00 [0.97–1.04]
Number of household members	1.00 [0.98–1.03]	0.99 [0.95–1.03]
Urban (vs. Rural)	1.67 [1.42–1.97]***	1.44 [1.15–1.79]**
Catholic (vs. Protestant)	1.02 [0.88–1.18]	1.20 [0.97–1.50]~
Muslim (vs. Protestant)	0.51 [0.36–0.72]***	1.07 [0.55–2.07]
Married (vs. Unmarried)	0.91 [0.71–1.18]	0.84 [0.60–1.18]
Assets index	1.27 [1.22–1.32]***	1.28 [1.20–1.36]***

Table 3b: Odds ratios from reduced form controlled logistic regression models for the delivery outcomes

	Model 4	Model 5
	<i>Delivery in a health facility</i>	Delivery in a private facility, conditional on delivery in a facility (n=3764)
Regional level covariates included	yes	yes

Notes: Italicized outcomes represent achievement of a maternal health care standard. Cell entries are odds ratios and [95% confidence intervals] for Models 1 and 2 and regression coefficients and (standard errors) for the linear regression model (Model 3). All models also include an intercept term and a time indicator for the post-intervention period (2003). Regional covariates include percentage change in income from 1994 to 1997 and median family income in 1997.

~
p<0.10,

*
p<.05,

**
p<.01,

p<.001

Notes: The italicized outcome represents achievement of a maternal health care standard. Cell entries are odds ratios and [95% confidence intervals]. All models also include an intercept term and a time indicator for the post-intervention period (2003). Regional covariates include percentage change in income from 1994 to 1997 and median family income in 1997.

~
p<0.10,

*
p<.05,

**
p<.01,

p<.001

Table 4

Odds ratios from stratified analyses by urbanicity, employment status, and wealth of the impact of PhilHealth on achievement of prenatal care standards

	At least 4 prenatal visits	First prenatal visit by month 4
Urban	1.01 [0.98–1.05]	1.03 [0.99–1.07]
Rural	1.04 [1.01–1.07] **	1.04 [1.02–1.07] ***
Employed	1.04 [1.01–1.07] *	1.04 [1.01–1.06] **
Unemployed	1.03 [1.00–1.06]~	1.03 [1.00–1.06] *
Lowest wealth tertile	1.04 [1.00–1.07] *	1.05 [1.02–1.08] **
Middle wealth tertile	1.03 [0.99–1.06]	1.03 [1.00–1.07]~
Upper wealth tertile	1.01 [0.97–1.06]	1.00 [0.97–1.04]

Notes: Cell entries are odds ratios and [95% confidence intervals]. Individual controls include urbanicity, age, years of education, marital status, assets index, religion, parity, number of household members, and age at first birth (except when a covariate is used for stratification). Regional controls include percentage change in income from 1994 to 1997 and median family income in 1997. The presence of Well Family Clinics is also controlled for in these analyses.

~
p<0.10,

*
p<.05,

**
p<.01,

p<.001