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Fiscal Decentralization and Health Service Delivery: An Assessment

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Abstract

More than 25 years into the implementation of the Local Government Code of 1991, it is inconclusive whether fiscal decentralization indeed improves health service delivery in the Philippines. There is lack of studies that employ rigorous quantitative approach to address the research issue at hand. In this regard, the study attempts to contribute to the small body of literature and motivate further research and generation of reliable data that are crucial for evidence-based/informed policymaking. In particular, the study proposes an analytical framework that examines the effects of fiscal decentralization on health service delivery using difference-in-differences (DID) method. It draws up the standard measure of the extent/degree of fiscal decentralization affecting the health sector. Such endeavor is the first ever attempt to measure the extent/degree of health devolution in the Philippines, i.e., in terms of the health expenditure decentralization ratio.

The output variables of interest include access to safe water and sanitation, health facility-based delivery, and access to hospital inpatient services. The control variables include two measures of fiscal decentralization to account for financial/fiscal autonomy of the local government units (LGUs) on the income side (i.e., the ratio of LGU own-source revenue to LGU expenditures and ratio of LGU own-source revenue to LGU income); LGU health spending as a proportion of total LGU expenditures; and per capita LGU income. The choice of variables was constrained by unavailability of disaggregated data at the LGU level.

The findings of the DID analysis suggest that greater health decentralization has negative impact on access to hospital inpatient services and access to sanitation (toilet). It contradicts the hypothesis of the study that expects greater health decentralization to result in better health services. Nevertheless, it is consistent with the narrative in the literature that points out the lower province-level spending on hospitals due to mismatch between the cost of devolved hospitals and the internal revenue allotment (IRA), i.e., block grant transferred to the LGUs. Such negative effect has remained over the years because most LGUs do not have adequate health budget to maintain and upgrade devolved health facilities.

Keywords: health devolution, devolution, fiscal decentralization, decentralization, and difference-in-differences (DID) analysis/method

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Fiscal decentralization and health service delivery: An assessment*

Janet S. Cuenca**

1. Introduction

The passage of Republic Act No. 7160 or the Local Government Code of 1991 (hereafter Code) meant the devolution[1] to local government units (LGUs) of many of the functions previously performed by national government agencies. Consequently, LGUs have assumed the major role in the delivery of basic services and in the operation of facilities in areas that include primary health care, hospital care, social welfare services, and local infrastructure facilities (e.g., health facilities and school buildings), among others (Section 17b of the Code).

Along with this responsibility is the inherent power that the Code vests on LGUs to create their own sources of revenue and levy taxes, fees, and charges (Section 129 of the Code). Aside from the taxing power, the Code also provides for a higher LGU share in internal revenue taxes (i.e., known as internal revenue allotment or IRA)[2] and national wealth (Manasan 1995). All these are aimed at providing adequate resources to LGUs for them to be able to exercise their powers and effectively perform the functions devolved to them. In this sense, the Code bestows full fiscal (i.e., involving both expenditure and income) autonomy on the LGUs and this is what fiscal decentralization is all about. In practical terms, local autonomy can mean LGUs' ability to link their spending decisions with their revenue/tax decisions (Manasan 2005).

The presumed benefits of decentralization such as improved service delivery (DOH-BLHD nd, Bahl and Linn 1992, WB 1993, Grundy et al. 2003, Dorotan and Mogyorosy 2004, WB 2005, WB and ADB 2005, Capuno 2008, PIDS 2009) are only realized when LGUs have discretion or autonomy over their subnational spending or financial resources (Boex and Simatupang 2009). Similarly, a significant local autonomy for both the taxing and expenditure side is critical in capturing the benefits of fiscal decentralization (Bahl nd).

These arguments are grounded on the conventional wisdom that local governments know better the preferences and needs of their constituents as well as the local costs, thus enabling them to match resources with local preferences and needs. This is expected to bring about efficiency and hence, improved service delivery. In this sense, fiscal decentralization holds a promise for improved service delivery. Nonetheless, such argument has not been adequately tested using rigorous quantitative techniques in the case of Philippines. The question on whether health devolution would indeed result in a more efficient and equitable resource allocation raises concerns (Solon and Herrin 2017).

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* This paper was lifted from Chapter 3 of the author's PhD Dissertation titled "Fiscal Decentralization and Health Service Delivery: The Philippine Case." The usual disclaimer applies.

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[1] Transfer from the national government to local/subnational government of the authority for decision-making, finance, and management (Kaiser 2006).

[2] IRA is a formula-based block grant, which entitles LGUs almost full discretion in its utilization (Manasan 2005). Under the Code, the total IRA is set at 40 percent of actual internal revenue tax collections of the national government three years prior to the current year. It is divided among the different levels of government as follows: 23 percent to provinces, 23 percent to cities, 34 percent to municipalities, and 20 percent to barangays. The IRA distribution to individual LGUs by tier of local government follows a predetermined formula that is based on population (50 percent), land area (25 percent), and equal sharing (25 percent).

In this light, the study attempts to address the questions: What is the impact of fiscal decentralization on health service delivery in the local governments of the Philippines? Has fiscal decentralization achieved the goal of improving local health service delivery in the country? The effect of fiscal decentralization on local service delivery has implications on human development, particularly in improving the health status of the populace. Nevertheless, there is scant and mixed evidence on the effects of fiscal decentralization on health systems performance, particularly in terms of health outputs/outcomes (e.g., WB nd, Quimpo 1996, Azfar et al. 2000, Atienza 2004, Smoke 2004, Faguet and Sanchez 2009, DOH 2010, WB 2011, Local Development International LLC 2013, NCPAG-CPED 2014, Regmi 2014, Tobi and Regmi 2014, DOH and EU 2015, and Ecorys 2015).

More specifically, there is not much empirical evidence to adequately test fiscal decentralization in the Philippine context. In general, health decentralization[3] is an under-researched area (Atienza 2004). "The empirical evidence on decentralisation outcomes in the Philippines remains limited and the results are rather mixed (Local Development International LLC 2013, p.32)." There is scant literature on the impact of the decentralization experiment on health in the Philippines (Abrigo et al. 2017). On academic or theoretical level, the study contributes to the decentralization literature by testing empirically the Oates' Decentralization Theorem[4] as applied in health service delivery. In this sense, it adds evidence on the effects of fiscal decentralization on local health service delivery with focus on the Philippines. On public policy level, the study provides hard evidences in pursuit of evidence-based/informed policymaking.

The rest of the study is organized as follows. Section 3.2 reviews the implications of health devolution in the country and also the, the effects of health devolution with highlights on what it has achieved thus far based on existing literature. Section 3.3 presents methodology and the required data. Section 3.4 analyzes the results and Section 3.5 ends the study with the concluding remarks.

2. Effects of Health Devolution on Service Delivery and Health Outcomes

Anecdotal evidences abound on how most of the LGUs in the Philippines perform poorly in health service delivery. Existing qualitative studies (e.g., AYM 1995, Perez 1998a, Perez 1998b, Furtado 2001, Grundy et al. 2003, Atienza 2004, Diokno 2009, PIDS 2009, Manasan and Cuenca 2010a, among others) validate these evidences. All these accounts bring to the fore the question of whether health devolution has been effective in bringing about the expected potential benefits such as improved service delivery, which in turn affect health outcomes.

With the implementation of health devolution more than 25 years ago, the interesting question to ask now is: has the delivery of devolved services improved? Such question is difficult to answer because there was "no nation-wide effort to assess the performance of local governments" more than ten years after the passage of the Code. However, there were

[3] Refers to fiscal decentralization affecting the health sector; used interchangeably with health devolution.
[4] "For a public good – the consumption of which is defined over geographical subsets of the total population, and for which the costs of providing each level of output of the good in each jurisdiction are the same for the central or for the respective local government – it will always be more efficient (or at least as efficient) for local governments to provide the Pareto-efficient levels of output for their respective jurisdictions than for the central government to provide any specified and uniform level of output across all jurisdictions (Oates 1972, p.35),."

initiatives for measuring the performance of small sample of LGUs, albeit on a pilot basis financed by donor agencies (Diokno 2009, p. 178).[5]

Measuring LGU performance is made difficult by the mixed national and local government inputs, as well as the many arising problems/constraints from both the national and local government side. An important constraint in undertaking a rigorous analysis of LGU performance is "lack of suitable comparative nationwide data at a disaggregated level (WB and ADB 2005, p. 5)." After almost 15 years of decentralization, satisfaction surveys done to assess public services suggest mixed results on local government performance. The scarcity in hard evidence on LGU's service delivery performance is due to the inaccessibility of data that are disaggregated at the local level (World Bank 2010).

Consequently, only few quantitative studies have been done to examine the effects of fiscal decentralization on health service delivery and/or health outcomes. Schwartz, Guilkey, and Racelis (2002) examine whether or not decentralization results in more health care provision using a dataset comprised of about 1,600 local government units pre- and post-devolution in the Philippines. Based on the study, local expenditures increased the use of public health services (e.g., use of family planning and immunization) and these expenditures had substantial impact on health-related outcomes.

On the other hand, employing panel data analysis on 1,978 children in Cebu, Maccini (2006) addresses the question: "do local government resources affect child health?" in the context of fiscal devolution. However, the said study focuses only on the effect of per capita block grant at the barangay level[6] on the individual health outcome (i.e., nutritional status). Based on the study, higher increases in per capita block grants result in higher growth in body mass index (BMI) of children and lower hospitalization. Due to limited data on possible channels, the study failed to establish how per capita block grant[7] affects the health outcome. "However local governments chose to spend the money, I find that improved child health was one consequence (intended or unintended) [Maccini 2006, p. 3]."

In contrast, Llanto and Quimba (2010) used regression models to analyze the impact of decentralization on health at the regional level.[8] The study conducted panel data analysis with the number of live births as dependent variable and inputs (e.g., number of doctors and number of midwives), income, and decentralization dummy as independent/explanatory variables. Results show that there is partial improvement in the delivery of health services resulting from decentralization. On the other hand, Uchimura (2012) shows that municipal health expenditure (i.e., expressed as provincial average of the per capita municipal health expenditure) did not have effects on both health output (i.e., provincial immunization rate) and health outcome (i.e.,

[5] The Local Governance Performance Management System (LGPMS) of the Department of the Interior and Local Government (DILG) is not meant to be a scorecard for the performance and productivity of the LGUs but rather a self-assessment management and development tool (i.e., by setting a benchmark or a performance scale of 5 for excellence in performance and 1-4 to indicate areas for improvement) to enhance management and performance of an LGU. In contrast, DOH's LGU Scorecard, launched through DOH Administrative Order No 2008-0017, is a tool for tracking the progress of health reform implementation and measuring the performance of the local health systems. It is also used as basis for variable tranche allocation to province-wide health systems. Although it is composed of a number of performance indicators including 15 indicators for service delivery, it provides limited information as to how health devolution affected service delivery.

[6] The title seems to include all local government resources such as block grants (i.e., the internal revenue allotment/IRA), own-source revenues, and other national government transfers. The own-source revenues and other transfers may also have effect on child health.

[7] Block grant is unconditional cash transfer provided to local governments. Due to limited data on the how the block grant is allocated across various sectors, it is not clear whether a portion or all of it is used for health-related spending.

[8] The authors recognize that using regional data is not ideal to analyze local service delivery. They highlight the importance of conducting the analysis at a more disaggregated level (e.g., provinces, cities, and municipalities) to fully capture the effect of decentralization on local service delivery.

provincial infant mortality rate). The study explains that higher health expenditure does not necessarily translate into more services or better health outcomes.[9]

Among the studies cited above, the indicator used to proxy for decentralization is local health expenditure (Schwartz, Guilkey, and Racelis 2002 and Uchimura 2012). Health devolution is expected to result in increased local health spending because the local governments take on the responsibility of delivering the devolved services. However, based on Uchimura (2012)'s findings, the link between health spending and health outcomes is yet to be established. In contrast, the variable of interest in Maccini (2006) is the per capita block grant by barangay, which is not indicative of the LGUs' spending priorities and thus, it is difficult to establish its link to health outcomes. On the other hand, Llanto and Quimba (2010) introduce a decentralization dummy variable to distinguish between pre- and post- devolution period but it should be noted that decentralization policy was implemented nationwide and thus, defining the counterfactual for the analysis is a huge challenge.

In sum, this literature review finds that none of these studies employs the standard/conventional indicators of fiscal decentralization (i.e., the revenue decentralization ratio, expenditure decentralization ratio, modified expenditure decentralization ratio, and financial autonomy ratio as defined in Loehr and Manasan 1999) that are widely used in literature (e.g., Treisman 2002, Khaleghian 2003, Schneider 2003, Rodden 2004, Jimenez and Smith 2005, Eaton and Schroeder 2006, Rubio 2010, among others) in examining the effect of decentralization/devolution on variables of interest such as health outputs/outcomes.

In this regard, the current study draws up the standard measure of the extent/degree of fiscal decentralization affecting the health sector. Such endeavor is the first ever attempt to measure the extent/degree of health devolution in the Philippines, i.e., in terms of the health expenditure decentralization ratio. Such ratio measures the share of LGU health spending to general government health spending, which refers to the combined national government (Department of Health/DOH) and LGU health spending.

Moreover, the literature review identifies an important research gap in decentralization literature: the dearth in studies that employ rigorous quantitative analysis to examine the impact/effect of fiscal decentralization on health in the Philippine context. The existing literature on the said topic is "characteristically thin and with varying degree of methodological rigor (Abrigo et al. 2017, p.1)."[10] "More recent reviews lament the scarcity of formal analysis. Many indices (quantitative and qualitative) and survey instruments have been used, but they focus on selected aspects of performance and LGUs and are rarely replicated (Local Development International LLC 2013, p.33)."

The research gap is due to the huge data gap (i.e., unavailability of disaggregated data as pointed out in WB [2005, 2010]), particularly the lack of readily available data on the spending of the DOH at the province level, thus making it challenging to estimate the health expenditure decentralization ratio. This study attempts to address the identified research gaps by first filling in the huge data gap, i.e., by constructing the province-level database required to analyze the effect of fiscal decentralization on health service delivery (or health decentralization/ devolution) and also, by proposing an analytical framework in conducting such analysis.

[9] Capuno and Solon (1996) look into the impact of health devolution on local health expenditure. However, the link between local health expenditure and health outcome has yet to be established in the case of the Philippines given Uchimura (2012)'s findings.
[10] Among the existing literature on the impact of devolution/decentralization on health, only four studies qualified in Abrigo et al. (2017)'s systematic review based on the rigor of methods used.

3. Methodology

The study employs Difference-In-Differences (DID) method to infer the causal effect of the extent/degree of fiscal decentralization on health service delivery in the local government units/LGUs (i.e., about 1,491 municipalities, 143 cities, and 81 provinces) that the study consolidated at the province level in the period 2001-2013[11], except 2005 due to data unavailability.

However, it excludes the provinces (i.e., Basilan, Sulu, Tawi-Tawi, Lanao del Sur, Maguindanao, and Shariff Kabunsuan) of the Autonomous Region in Muslim Mindanao (ARMM) because it follows a different organizational and governance structure as mandated in the Republic Act 6734 of 1989.[12] The ARMM "has retained the centralized character of its health system under the ARMM DOH, which directly runs the provincial hospitals and the municipal health centers under its jurisdiction instead of the component provinces and towns of ARMM (Romualdez et al. 2011, p.21)."

Consequently, 75 provinces are left but for the purpose of the study, Dinagat Islands was integrated with Surigao del Norte because it was part of Surigao del Norte until December 2006,[13] thus resulting in 74 provinces. Nevertheless, to ensure balanced panel data (or pooled cross-sections for 2001-2013, except 2005), the study uses two datasets[14] which contain:

i. 54 provinces, including their respective component municipalities and cities to study the effect of health devolution on the following health service delivery indicators:

   a. Access to hospital inpatient services (i.e., measured in terms of government hospitals'[15] authorized bed capacity expressed as a ratio to population[16] and standardized to per 10,000 population) – refers to the levels of access to hospital inpatient services by designated populations (WHO 2010). It is used in the study to proxy for data on utilization of hospital inpatient services at the province level.
   b. Health facility-based delivery (i.e., measured in terms of proportion of facility-based deliveries or percentage of births attended in health facilities) based on Saavedra 2010

[11] LGU data in BLGF-DOF for the early 1990s up to 2000, albeit complete for all LGUs, lumped health spending with other social spending (i.e., education, social welfare, housing, and community development) and internal safety (i.e., peace and order, fiscal adjudication, etc.) into an aggregated LGU spending called public welfare and internal safety. The study is interested in LGU health spending only and there is no way to extract such from the aggregated data. Hence, these LGU data cannot be used in the study, thus limiting the timeframe of the study to 2001-2013 only.

[12] An Act Providing for an Organic Act of the Autonomous Region in Muslim Mindanao

[13] Data on Dinagat Islands became available starting 2007 only and thus, the need to integrate it with its original province, i.e., Surigao del Norte.

[14] A total of 20 provinces do not have data for health facility-based delivery, thus the first dataset contains 54 observations only. On the other hand, 24 provinces do not have data for either water or sanitation and another 13 provinces have values over 100 percent, which are considered outliers and thus dropped from the dataset. Hence, the second dataset is left with 37 provinces.

[15] Excludes regional hospitals (i.e., DOH-retained hospitals) due to limitations in health facility utilization data that are needed to distribute their benefits by province; To elucidate, health facility utilization data in the APIS is available only for 2002, 2004, and 2007. Moreover, government hospitals are lumped together and there is no way to disaggregate the utilization data into specialty hospitals (mostly located in NCR such as the Philippine Heart Center, Lung Center of the Philippines and National Kidney and Transplant Institute, to name a few), regional (i.e., DOH retained such as Batangas Regional Hospital, Western Visayas Medical Center, and CARAGA Regional Hospital, among others), provincial, or municipal hospitals. On the other hand, the National Demographic and Health Survey (NDHS) data on utilization of regional hospitals and public medical centers at the province level are not reliable due to significant sampling errors as NDHS domains are at the regional level. Sample size at the province level is too small.

[16] Based on Field Health Services Information System (FHSIS) population data used by the DOH program managers; used also in computing per capita spending in the current study

ii. 37 provinces, including their respective component municipalities and cities to study the effect of health devolution on:

   a. Access to hospital inpatient services;
   b. Access to safe water (i.e., measured in terms of proportion of households with access to safe water) based on Sousa and Ramos (1999) and Sousa and Stosic (2005); and
   c. Access to sanitation (i.e., measured in terms of the proportion of households with access to sanitation/toilet).

Since fiscal decentralization has been implemented nationwide starting 1992, no control/comparison group exists. For the purpose of the study, the treatment and control groups are defined on the basis of the extent/degree of health decentralization (Cavalieri and Ferrante 2016 and de Aguiar 2006) in the period 2001-2013 (except 2005 due to data unavailability) considering that the adoption rate of decentralization varies across LGUs. Such variation is expected to explain the disparity in health outputs among LGUs. In this sense, the study analyzes the causal effect of the extent/degree of fiscal decentralization on health service delivery. More specifically, it tests the hypothesis that greater fiscal decentralization results in better health service delivery (e.g., better access to hospital inpatient services, safe water, and sanitation; and health facility-based delivery).

Following Duflo (2001), policy exposure at the province level is defined by the degree/extent of health devolution and period under study. In particular, the provinces were divided into two categories (Annex Tables 1 and 2), namely, high (i.e., treatment group, which has greater or higher adoption rate of health decentralization) and low (i.e., control group, which has lesser or lower adoption rate of health decentralization) in the period 2001-2004, which is ten years after (i) the passage of the Local Government Code of 1991 on October 10 with effectivity on the first of January 1992, (ii) the changeover phase covering 1992-1993[17], (iii) and the start of the transition phase of health devolution in 1994. In this light, the period 2001-2004 is considered the baseline period while the years after 2004 comprise the post-intervention period, wherein LGUs are expected to have developed adequate capabilities (i.e., including fiscal capacity) in managing local health systems, thus stabilizing the adoption of health devolution. It should be noted, however, that during the post-intervention period DOH incurred huge spending for HFEP and deployment of health personnel to LGUs, both of which are devolved functions.

The categorization into greater and lesser health decentralization is based on the fiscal decentralization indicator for the expenditure side namely, health expenditure decentralization ratio (HEDR). It is given by the ratio of LGU health spending per capita and general government (i.e., national government/DOH and LGU combined) health spending per capita, both in real terms. The LGU health spending considered in the study is the sum of the health spending of the province and the total health spending of its component municipalities and cities. On the other hand, national government health spending at the province level (i.e., including component municipalities and cities) refers to the expenditure of the DOH on direct health service delivery following Manasan and Cuenca (2006), particularly on public health and hospital services that have been devolved to the LGUs.

[17] DOH (1997) recounts that the transfer of facilities, personnel, program, and services of the DOH were completed in April 1993.

The HEDR customizes to the health sector[18] the standard/conventional criterion for measuring the extent/degree of fiscal decentralization (i.e., the expenditure decentralization ratio/EDR[19]) as identified and used in Loehr and Manasan (1999), Treisman (2002), Khaleghian (2003), Schneider (2003), Rodden (2004), Eaton and Schroeder (2006), Elhiraika (2007), Kyriacou and Sagales (2010), Rubio (2010), Martinez-Vazquez (2011), Uchimura and Suzuki (2012), and Ivanyna and Shah (2013), among others. It indicates the importance of local health expenditures in general government health expenditures. It also reflects the autonomy of local governments with regard to health spending decisions that are expected to be linked with their revenue/taxing decisions. In other words, it measures the degree by which the local governments have taken the responsibility of financing and delivering health services at the local level.

The concept of autonomy is explained by considering subnational/local expenditure as a percentage of total expenditure, which is the fiscal impact exercised by lower governments as opposed to that exercised by central government. Such measure is "the most appropriate way to gauge fiscal decentralization" because "a larger proportion of the expenditures spent by lower level governments indicate that fiscal impact has shifted away from the central government (Schneider 2003, p.37)." In the same vein, "a system is more fiscally decentralized the greater the proportion of tax-revenues and expenditures "owned" by lower tiers of government (Kyriacou and Sagales 2010, p.7)." Likewise, "whether or not local governments command a significant share of national expenditures indicates their respective role in multi-order public governance (Ivanyna and Shah 2013, p.5)."

Based on Wooldridge (2009), the econometric model is given by the equation:

$$y = \beta_0 + \delta_0 after04dum + \beta_1 treatdum + \delta_1 treat\_after04 + \alpha X + \varepsilon \qquad (1)$$

where

y – health output variable of interest
after04dum – dummy variable for the second (post-policy change) time period
treatdum – dummy variable that takes on the value of 1 for those in the treatment group and 0 otherwise
treat_after04 –interaction term between the two dummy variables listed above
δ_1 – measures the effect of fiscal decentralization affecting the health sector (or health decentralization/devolution)
X – control variables (confounding factors)
ε – error term

[18] It is fully devolved in the Philippines as mandated in the Code. However, in reality, the DOH funds/subsidizes vertical programs (i.e., mostly public health programs such as the Expanded Program in Immunization and control of infectious or communicable diseases) to ensure that the national objectives for health are achieved. It also funds/subsidizes programs that concern deployment of health human resources to the LGUs as well as the construction, repair, and maintenance of health facilities, including those that are already devolved to the LGUs. Section 17(f) of the Code allows this.
[19] Based on Loehr and Manasan (1999), EDR measures the relative importance of local revenues or expenditures in general government revenues or expenditures.

Figure 1. Illustration of the Difference-in-Differences Estimator

	Before	After	After - Before
Control	β_0	$\beta_0 + \delta_0$	δ_0
Treatment	$\beta_0 + \beta_1$	$\beta_0 + \delta_0 + \beta_1 + \delta_1$	$\delta_0 + \delta_1$
Treatment – Control	β_1	$\beta_1 + \delta_1$	δ_1

Source: Wooldridge (2009)

The output variables of interest are already mentioned above. The study could have benefited from the availability of data on immunization coverage rate, which is a good indicator of public health. Nevertheless, a closer look at the data indicates measurement errors due to the assumption that the proportion of children aged 0-9 months is about 3 percent of the total population of each LGU across the years. This is a tall assumption considering that population growth varies across LGUs and over the years.

Based on intercensal population growth rate, the Philippine population had been declining and thus, the target population of 3 percent per year from 2001-2013 is too high for the LGUs to achieve. Consequently, the immunization coverage rate is too low (i.e., far from the 95 percent target set in the 205-2010 Medium-Term Philippine Development Plan) and has been declining across the years. Based on Villaverde et al. (2016), local health workers emphasized the need to revise the method used in estimating the target coverage for newborns and infants, i.e., by using data on actual live births within a time period for specific areas or LGUs, instead of the projected eligible population.

The misleading coverage rate data for immunization is a cause of concern especially when it is used as basis for planning, budgeting, and policymaking. To elucidate, the DOH procures the vaccines based on the target population. Imagine the inefficiency that results when the program is over-targeting its eligible population. In addition, the immunization coverage rate (or percentage of fully immunized child) is one of the indicators in the LGU Scorecard, which assesses the performance of LGUs in health service delivery and becomes the basis for financial allocation. Undeniably, health indicators have critical role in policymaking (Cuenca 2016) and so the importance of accuracy and reliability of such indicators cannot be overemphasized.

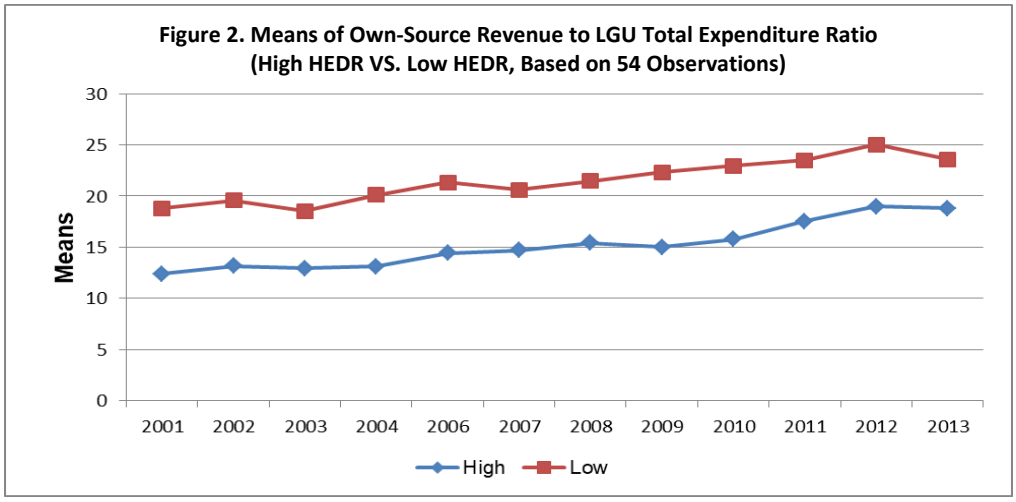
The control variables used in the study include:

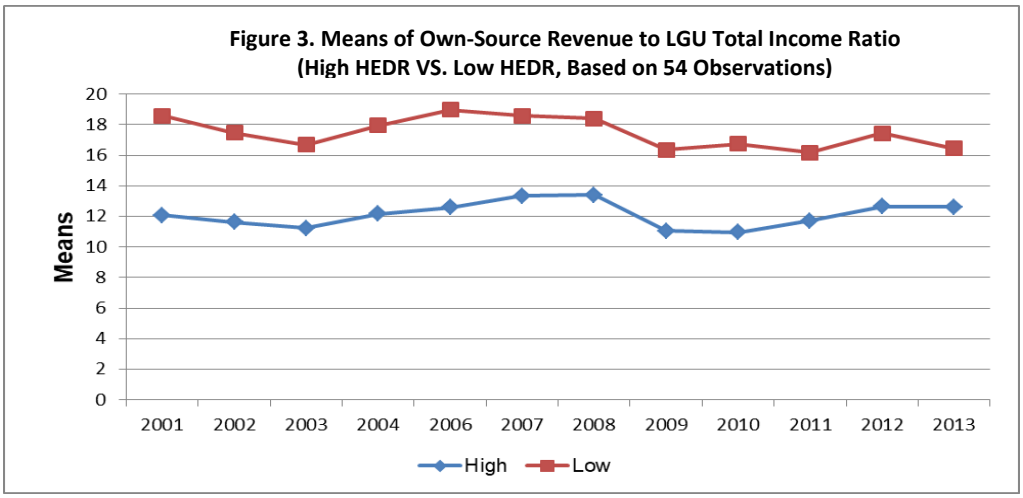
i. Financial/fiscal autonomy ratio which is defined by El Mehdi and Hafner (2014) as the ratio of LGU own-source revenue to LGU expenditures;
ii. Financial/fiscal autonomy ratio which is defined by Loehr and Manasan (1999) as the ratio of LGU own-source revenue to LGU income;
iii. Ratio of LGU health expenditure to total LGU expenditure or LGU health spending as a proportion of all subnational (or LGU) expenditures based on Khaleghian 2003; and
iv. Per capita LGU income (in 2000 constant prices) following Asfaw et al. (2008).[20]

The first two control variables measure the degree of fiscal decentralization on revenue side (i.e., revenue decentralization). The third one measures the LGU's prioritization of health spending relative to total LGU spending while the fourth one measures LGU's financial capacity. On the average, the treatment group is characterized by lesser fiscal autonomy on the

[20] Provincial per capita Gross Domestic Product (GDP) in Habibi et al. (2003) and Uchimura and Jutting (2007); per capita GDP used in cross-country studies (e.g., Robalino et al. 2001 and Rubio 2010)

revenue side (Figures 2 and 3). It indicates the higher dependence of the treatment group (i.e., with high HEDR) on externally sourced income such as block grants.



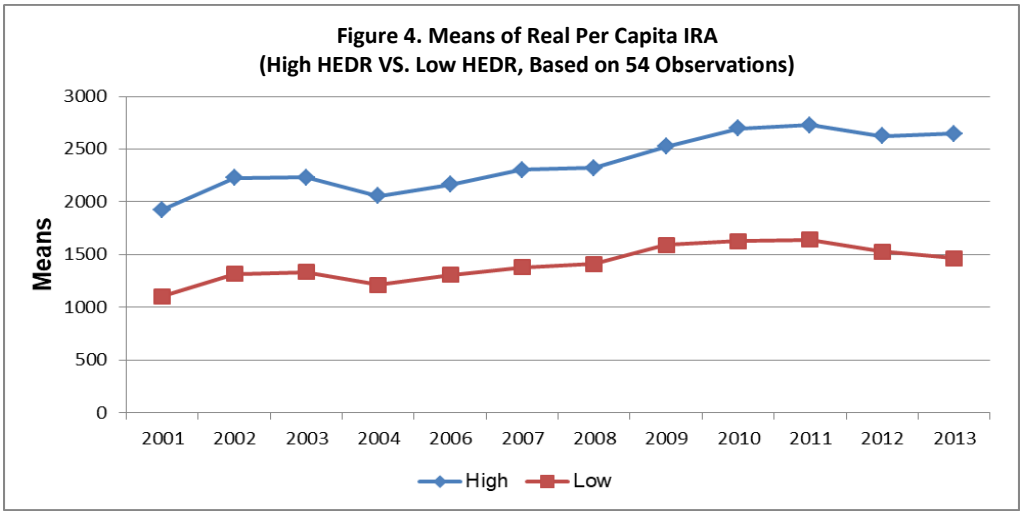


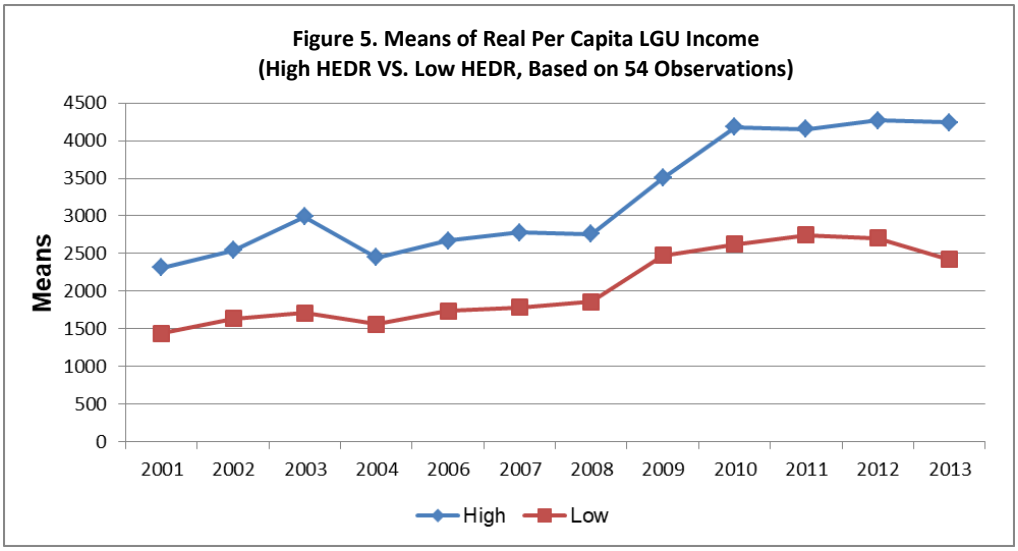
Apparently, the treatment group receives higher IRA relative to the control group (i.e., with low HEDR) as shown in Figure 4. Consequently, it has higher per capita LGU income, on the average (Figure 5). With greater revenues, it gives higher priority to health spending as compared to the control group (Figure 6).

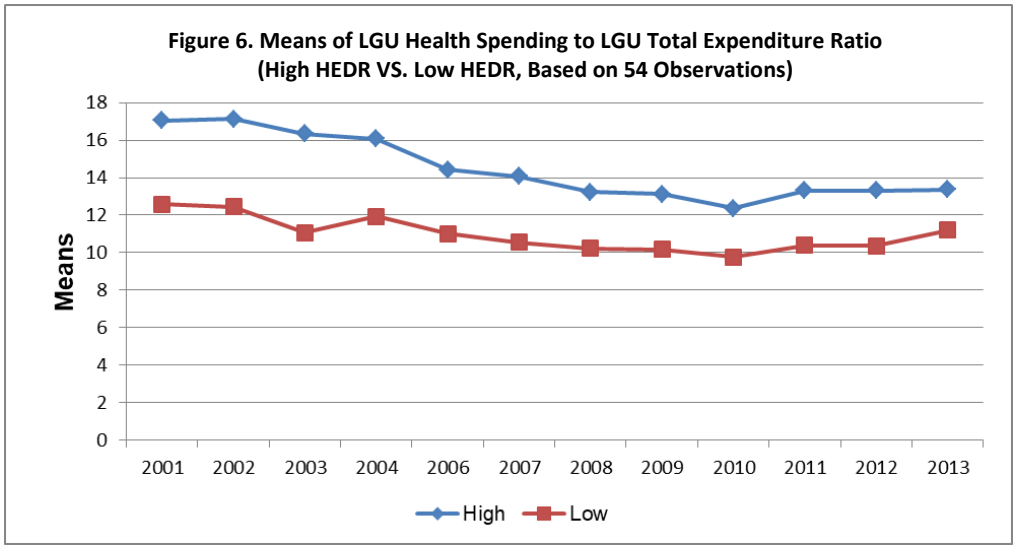
In this light, lesser revenue decentralization does not necessarily imply lesser health decentralization. LGUs can exercise their fiscal autonomy by linking their revenue decisions with their spending decisions. Such findings bring to the fore the importance of examining both revenue and expenditure aspects of fiscal decentralization in any analysis that looks at its impact on service delivery.

The choice of control variables was constrained by unavailability of data, particularly disaggregated data at the LGU level for 2001-2013, except 2005. The study recognizes the importance of adding the control variable that captures the coverage or utilization of PhilHealth (i.e., social health insurance), which certainly affects access to hospital inpatient services. However, such data are not readily available. The available data on PhilHealth membership in the National Demographic and Health Survey (NDHS) is not reliable at the province level because the NDHS domains are at the regional level. Province-level data suffer from significant

sampling errors because sample size at the province level is small. Moreover, the NDHS is available only every five years.







Likewise, the study recognizes the importance of including the control variable that represents data on per capita household income by province (i.e., including component municipalities and cities) which also affects access to government hospital inpatient services. Nevertheless, the available data in the Family Income and Expenditure Survey (FIES) for 2003, 2006, and 2009 are reliable only at the regional level unlike the FIES for previous years which provide reliable estimates "of income and expenditure levels for each province of the country, key cities, and key municipalities (Ericta and Fabian 2009, p.3-5)."[21] In this regard, exclusion of the said variables forms part of the limitations of the paper.

Table 1 summarizes the sources of basic data for the variables used in the study. [22] The provincial breakdown (i.e., including component municipalities and cities) of the DOH spending data is not available in the SAAOB and thus, it was estimated following Racelis et al. (2006) and in consultation with some program managers and experts.[23] Additional data on specific DOH programs were used in the estimation of LGU-disaggregated DOH spending such as (i) deployment of doctors to the barrio (DTTB) sourced from the DOH's Health Human Resource Development Bureau (HHRDB); (ii) deployment of doctors (i.e., medical officers and medical specialists) under the DOH's Medical Pool Placement and Utilization Program (MPPUP) based on Lawas et al. (2014); and (iii) Health Facilities Enhancement Program (HFEP) data sourced from the DOH's National Center for Health Facilities Development (NCHFD).

The conduct of DID analysis is anchored on the common or parallel trend assumption, which requires that in the absence of treatment, the difference between the "treatment" and "control" groups is constant over time[24]. Alternatively, the assumption posits that in the absence of treatment, the treatment and control groups would have the same trends. Testing for common or parallel trend can be done by showing a graph of the trends in both groups prior to policy intervention. Graphs generated for such test are in Figures 7-11. Apparently, the common trend assumption does not hold for almost all output indicators, except for health facility-based delivery.

Such findings are validated by conducting a test of means to examine the difference between the means of output indicators of both the control and treatment groups in the pre-intervention period. Nevertheless, due to limited data points for pre-treatment period, it is difficult to establish that indeed common trend does or does not hold. Evidence for null hypothesis does not necessarily mean that there is no evidence for the alternative hypothesis. Likewise, "failing to find evidence of a violation does not necessarily imply finding evidence of no violation (Bilinski and Hatfield 2018, Slide No. 10)." Not having enough data may result in false negatives while having much data may result in false positives. In this regard, the study relaxes the common trend assumption and interprets results of DID analysis with caution.

[21] Ericta and Fabian (2009, p.5-6) mention that "the 2003 (2006) FIES involved the interview of about 51,000 sample households deemed sufficient to provide reliable estimates of income and expenditure levels for regions"
[22] By virtue of Executive Order (EO) 352 of 1996, the FHSIS has been included by the National Statistical Coordination Board (NSCB) in the system of designated statistics. The DOH and local governments indeed use FHSIS data in planning, budgeting, and policymaking. Nevertheless, care must be taken in using FHSIS data because of measurement issues, particularly concerning the data on the coverage of the country's Expanded Program in Immunization (EPI).
[23] The paper could have benefited from the Annual Reports of the Commission on Audit which indicate the geographical distribution of the budget of all national government agencies (NGAs). However, the DOH is one of those NGAs with incomplete or without submission of quarterly reports and thus, the Annual Reports do not reflect the complete picture of the DOH budget.
[24] https://www.mailman.columbia.edu/research/population-health-methods/difference-difference-estimation (accessed on June 17, 2019)

Table 1. List of Variables and Data Sources

Variables	Sources of Basic Data
Output Variables	
Access to safe water	Field Health Services Information System Department of Health
Access to sanitation	Field Health Services Information System Department of Health
Health facility-based delivery	Field Health Services Information System Department of Health
Access to hospital inpatient services	Authorized bed capacity as ratio to population (Standardized to per 10,000 population)
Authorized bed capacity	Health Facilities and Services Regulatory Bureau Department of Health
Population	Field Health Services Information System Department of Health
Control Variables	
Financial autonomy ratio, i.e., ratio of LGU own-source revenue to LGU expenditures	Bureau of Local Government Finance Department of Finance
Financial autonomy ratio, i.e., ratio of LGU own-source revenue to LGU income	Bureau of Local Government Finance Department of Finance
Ratio of LGU health expenditure to total LGU expenditure	Bureau of Local Government Finance Department of Finance
LGU income, in per capita real terms	Bureau of Local Government Finance Department of Finance
Treatment Variable	
Health expenditure decentralization ratio	Ratio of LGU health spending to general government (i.e., DOH and LGU) health spending
LGU Health Spending	Bureau of Local Government Finance Department of Finance
DOH spending at the province level (including component cities and municipalities)	Author's estimates based on DOH Statement of Appropriations, Allotments, and Obligations (SAAOB)

Using regression analysis, the econometric model given in Equation (1) above is run in Stata using two datasets, namely dataset1 (with 54 observations) and dataset2 (with 37 observations). As mentioned earlier, each dataset has its own set of output variables of interest but the control variables are the same for both. Also, for each dataset, there are two versions of the run, i.e., without and with fixed effects. Controlling for fixed effects is deemed important to take into account heterogeneity among the observations.

Description of Sample Data

Using dataset1, Table 2 presents the output variables and descriptive statistics with computation of the change in the means in 2006-2013 relative to the baseline period 2001-2004. The ratio of authorized bed capacity to population (i.e., standardized to per 10,000 population) deteriorated in the period 2006-2013. There is dramatic decline of about 16 percent between the baseline period and 2013. Looking at the levels, the number of authorized bed in majority of LGUs remained the same. Apparently, it has not kept pace with the increasing population. It should be noted that the operation of hospitals was devolved to the provinces without enough financial resources.

Table 2. Output Variables in the Sample (dataset1)

Variable	Statistic	2001	2002	2003	2004	2006	2007	2008	2009	2010	2011	2012	2013
Hospital bed to population ratio (per 10,000 population) *Variable name abcprat*	Obs	54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00
	Mean	4.65	4.57	4.55	4.56	4.54	4.58	4.42	4.22	4.50	4.28	4.29	3.84
	Std. Dev	3.37	3.33	3.23	3.21	3.27	3.37	3.30	2.77	3.15	2.81	2.75	2.89
	Min	1.24	1.22	1.20	1.11	1.22	1.21	1.08	1.06	0.94	0.93	1.12	0.35
	Max	16.35	16.15	15.95	15.75	15.38	15.65	17.86	12.49	15.06	13.19	12.34	12.21
Health facility-based delivery Variable name *hfbdel*	Obs	54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00
	Mean	22.54	23.07	24.64	25.93	27.53	30.27	35.21	41.23	49.82	58.89	66.80	76.44
	Std. Dev	11.80	10.92	12.30	11.98	13.12	15.17	17.65	16.15	20.35	18.85	18.06	14.83
	Min	5.00	5.61	5.68	6.06	5.94	5.91	6.83	10.69	16.18	17.52	31.58	33.58
	Max	57.26	58.51	64.33	56.85	61.98	78.82	89.03	83.59	93.29	95.58	95.71	98.32

	Average	Change in 2001-2004			Ave. Gr.	Change relative to baseline (2001-2004)							
	2001-2004	2002	2003	2004	2001-2004	2006	2007	2008	2009	2010	2011	2012	2013
Abcprat	4.58	-0.02	0.00	0.00	-0.01	-0.01	0.00	-0.04	-0.08	-0.02	-0.07	-0.06	-0.16
Hfbdel	24.04	0.02	0.07	0.05	0.05	0.14	0.26	0.46	0.71	1.07	1.45	1.78	2.18

With the huge financial requirement associated with the maintenance and operation of hospitals, significant improvement in the ratio of bed capacity to population (i.e., the level of access to hospital inpatient services by designated populations) cannot be expected unless the fiscal capacity of the provinces improves or external funding (e.g., DOH financial assistance under the Health Facilities Enhancement Program) comes. On the other hand, health facility-based delivery (i.e., measured in terms of the percentage of births attended in health facilities) increased significantly in the period 2006-2013, with about 200 percent growth in 2013 relative to the baseline period 2001-2004. Such improvement is critical in reducing maternal deaths. Based on FHSIS, there is a concomitant reduction of about 17 percent in the maternal mortality ratio (per 1,000 live births)[26] in 2013 relative to the baseline period. The ratio can be improved further by encouraging more health facility-based delivery. The percentage of births attended in health facilities in 2013 is only about 76 percent and thus, there is scope for improvement.

Table 3 shows the comparative analysis of the extent/degree of fiscal decentralization affecting the health sector measured by the health expenditure decentralization ratio (HEDR) and the output variables of the study sample, distinguished into control group and treatment group based on 54 observations. The HEDR across the years for both groups validate the assignment of the sample into control group and treatment group. The treatment group has higher HEDR than the control group in all years, albeit there is no difference, on the average, in the change relative to the baseline period.

Likewise, the ratio of the authorized bed capacity to population (i.e., standardized to per 10,000 population) is higher for the treatment group relative to the control group (Figure 7). To wit, the average of sample means in 2006-2013 for the former is 5.96 while it is 2.71 for the latter (Table 3). Similarly, the percentage of births attended in health facilities is higher for the treatment group compared to that of the control group (Figure 8).

The average of sample means in 2006-2013 for the former is about 50 percent while it is about 47 percent for the latter (Table 3). At first glance, this validates the hypothesis of the study, i.e., greater fiscal decentralization brings about better service delivery. Nevertheless, this should be confirmed based on the findings of the DID analysis.

Using dataset2, Table 4 presents the output variables and descriptive statistics with computation of the change in the means in 2006-2013 relative to the baseline period 2001-2004. The ratio of authorized bed capacity to population (i.e., standardized to per 10,000 population) declined in the period 2006-2013. It dipped by 19 percent in 2013 relative to the baseline period. Again, looking at the levels, the number of authorized bed in majority of the LGUs did not change while the population increased over time.

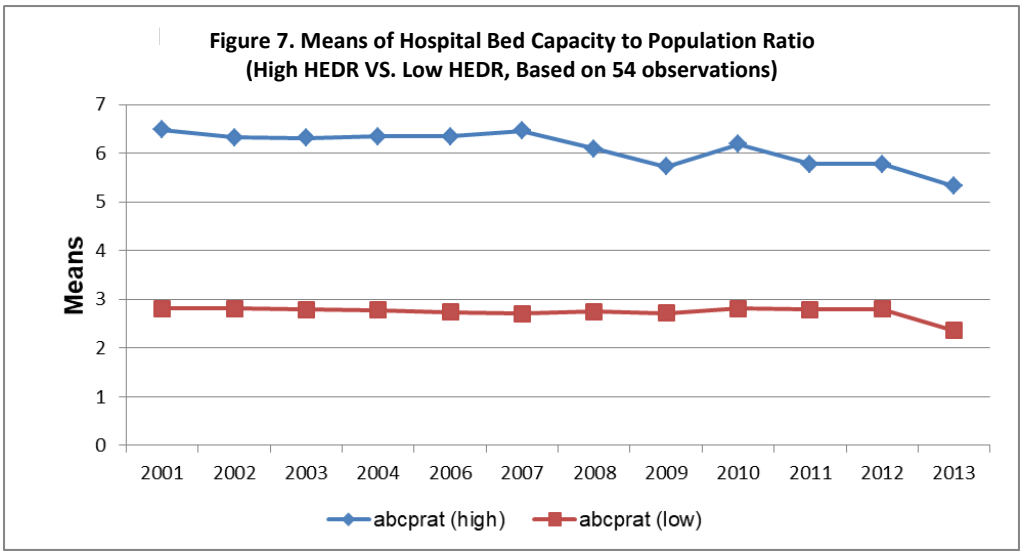
On the other hand, households with access to safe water and sanitation increased by 5 percent and 9 percent, respectively, in 2013 relative to the baseline period. Nevertheless, the proportion of households with access to sanitation (toilet) is only about 76 percent, on the average, in 2006-2013. About 24 percent of the households were deprived of access to sanitation and thus exposed to health risks. While the proportion of households with access to safe water is higher (i.e., about 83%, on the average) in the same period, it is still far from full coverage that is desired to prevent water-borne diseases such as diarrhea.

[26] The ratio is based on the number of maternal deaths and live births recorded and reported in government health facilities.

Table 3. Means of Output Variables and HEDR (54 observations)

	Average	Means								Average
	2001-04	2006	2007	2008	2009	2010	2011	2012	2013	2006-2013
Hospital bed capacity (Control)	2.80	2.74	2.70	2.74	2.72	2.82	2.79	2.80	2.36	2.71
Hospital bed capacity (Treatment)	6.37	6.35	6.46	6.09	5.73	6.19	5.77	5.77	5.32	5.96
Health facility-based delivery (Control)	22.73	25.89	29.08	35.05	38.93	45.23	58.23	65.73	74.47	46.58
Health facility-based delivery (Treatment)	25.35	29.16	31.47	35.38	43.52	54.42	59.55	67.86	78.41	49.97
Control Group (Low HEDR)	87.14	94.94	93.07	83.08	73.97	79.93	58.46	56.72	68.77	76.12
Treatment Group (High HEDR)	92.53	96.65	94.41	85.78	78.50	82.18	69.47	58.21	75.75	80.12

	Average	Change relative to baseline (2001-2004)								Average
	2001-04	2006	2007	2008	2009	2010	2011	2012	2013	2006-2013
Hospital bed capacity (Control)	0.00	-0.02	-0.03	-0.02	-0.03	0.01	0.00	0.00	-0.16	-0.03
Hospital bed capacity (Treatment)	-0.01	0.00	0.01	-0.04	-0.10	-0.03	-0.09	-0.09	-0.16	-0.06
Health facility-based delivery (Control)	0.05	0.14	0.28	0.54	0.71	0.99	1.56	1.89	2.28	1.05
Health facility-based delivery (Treatment)	0.05	0.15	0.24	0.40	0.72	1.15	1.35	1.68	2.09	0.97
Control Group (Low HEDR)	0.08	0.09	0.07	-0.05	-0.15	-0.08	-0.33	-0.35	-0.21	-0.13
Treatment Group (High HEDR)	0.04	0.04	0.02	-0.07	-0.15	-0.11	-0.25	-0.37	-0.18	-0.13



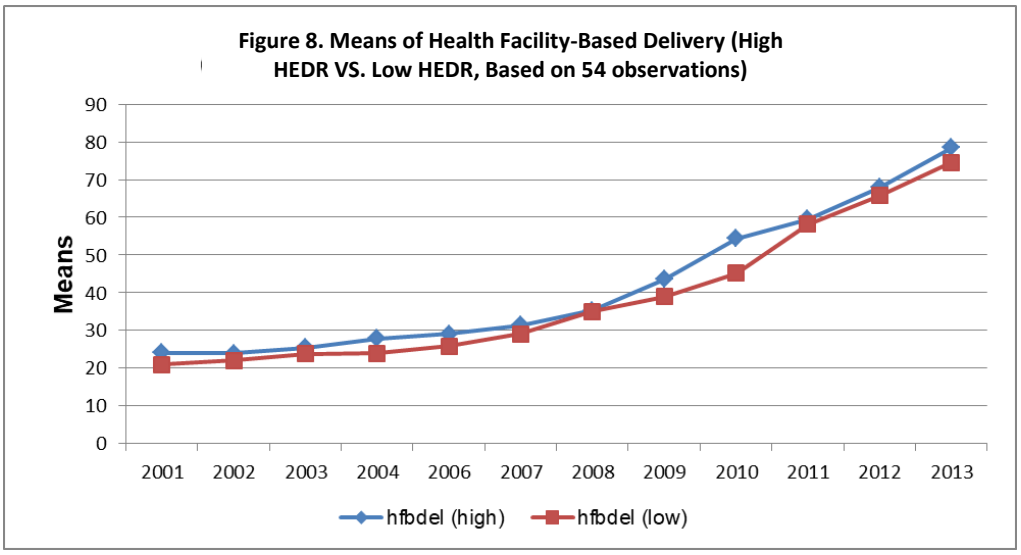


Table 5 shows the comparative analysis of extent/degree of fiscal decentralization affecting the health sector measured by the health expenditure decentralization ratio (HEDR) and the output variables of the study sample, categorized into control group and treatment group based on 37 observations. The treatment group indeed has higher HEDR as compared to the control group in all years (i.e., about 81 percent vis-à-vis about 75 percent, on the average in 2006-2013). Also, the reduction in HEDR is higher for the control group, i.e., 14 percent, on the average, in 2006-2013 relative to the baseline period.

The ratio of the authorized bed capacity to population (i.e., standardized to per 10,000 population) is higher for the treatment group relative to the control group (Figure 9). To wit, the average of sample means in 2006-2013 for the former is 5.33 while it is 2.88 for the latter. Nevertheless, the ratio for both groups deteriorated on the average in 2006-2013 relative to the baseline period. Hospital bed capacity per 10,000 population for the control group registered a 5 percent reduction while it is a higher decline (i.e., 9 percent) for the treatment group in the said period (Table 5).

Table 4. Output Variables in the Sample (dataset2)

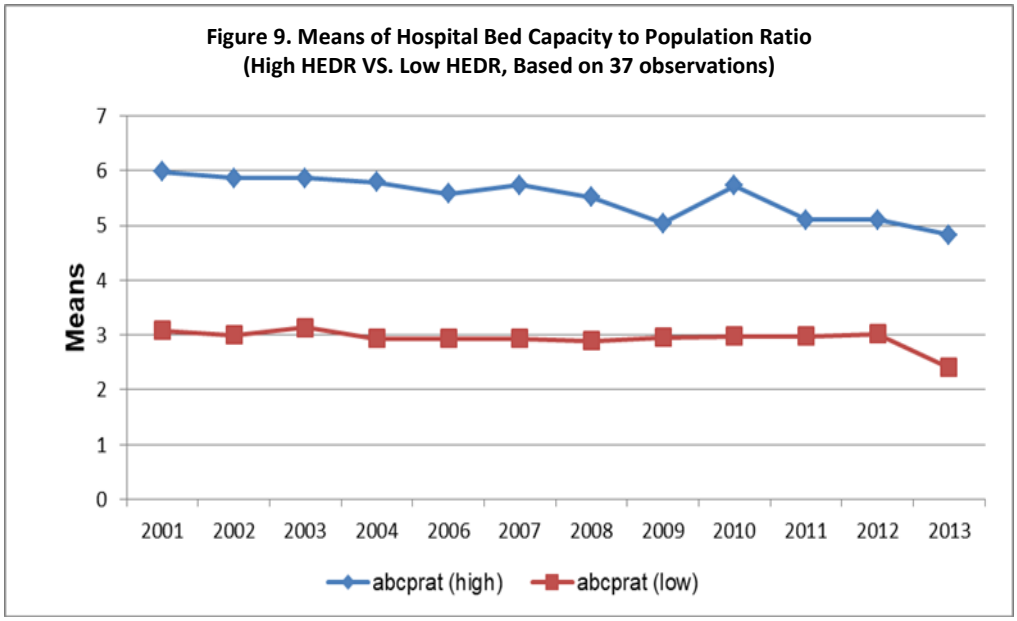
Variable	Statistic	2001	2002	2003	2004	2006	2007	2008	2009	2010	2011	2012	2013
Hospital bed to	Obs	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00
population ratio	Mean	4.49	4.39	4.46	4.32	4.21	4.30	4.17	3.97	4.31	4.01	4.03	3.58
(per 10,000	Std. Dev	3.13	3.12	3.04	3.01	2.87	3.02	3.19	2.36	2.81	2.25	2.14	2.32
population)	Min	1.24	1.22	1.20	1.11	1.40	1.21	1.08	1.06	0.94	0.93	1.12	0.93
Variable name abcprat	Max	16.35	16.15	15.95	15.75	15.38	15.65	17.86	10.13	15.06	10.41	10.10	9.94
Proporiton of HHs	Obs	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00
with access to safe	Mean	80.61	81.97	83.19	83.41	82.11	83.74	83.59	83.91	86.42	83.85	73.84	86.48
water	Std. Dev	15.54	13.46	14.38	12.22	14.51	11.74	16.86	15.23	9.00	16.87	26.06	11.91
Variable name	Min	36.23	49.99	47.90	53.75	30.72	40.04	15.03	24.44	64.86	25.20	4.18	56.21
hhpropwater	Max	100.00	99.41	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Proporiton of HHs	Obs	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00
with access to	Mean	70.89	68.70	73.38	71.38	74.61	77.12	76.12	70.15	76.77	76.53	78.23	77.38
sanitation	Std. Dev	13.63	22.00	15.00	15.08	14.85	11.92	16.14	20.48	12.62	14.67	11.99	13.56
Variable name	Min	40.80	7.08	33.52	33.94	44.53	45.41	16.74	17.31	44.23	27.42	45.72	42.03
hhproptoilet	Max	98.95	99.39	99.65	99.58	99.87	99.88	99.36	99.93	99.52	100.00	99.89	99.76

	Average	Change in 2001-2004			Ave. Gr. 2001-	Change relative to baseline (2001-2004)							
	2001-2004	2002	2003	2004	2004	2006	2007	2008	2009	2010	2011	2012	2013
abcprat	4.41	-0.02	0.02	-0.03	-0.01	-0.05	-0.03	-0.06	-0.10	-0.02	-0.09	-0.09	-0.19
hhpropwater	82.30	0.02	0.01	0.00	0.01	0.00	0.02	0.02	0.02	0.05	0.02	-0.10	0.05
hhproptoilet	71.09	-0.03	0.07	-0.03	0.00	0.05	0.08	0.07	-0.01	0.08	0.08	0.10	0.09

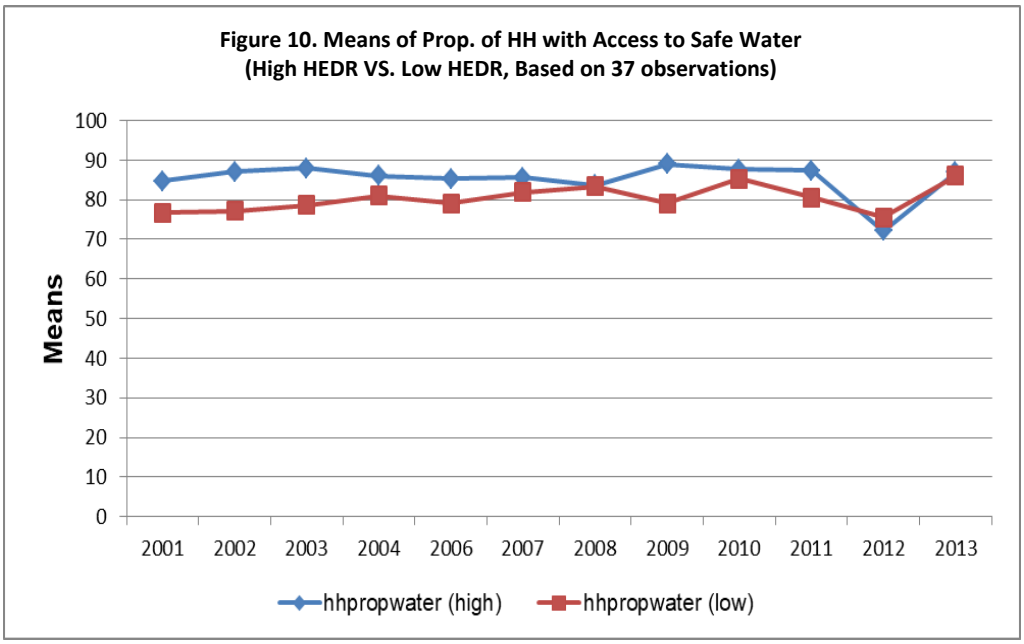
Table 5. Means of Output Variables and HEDR (37 observations)

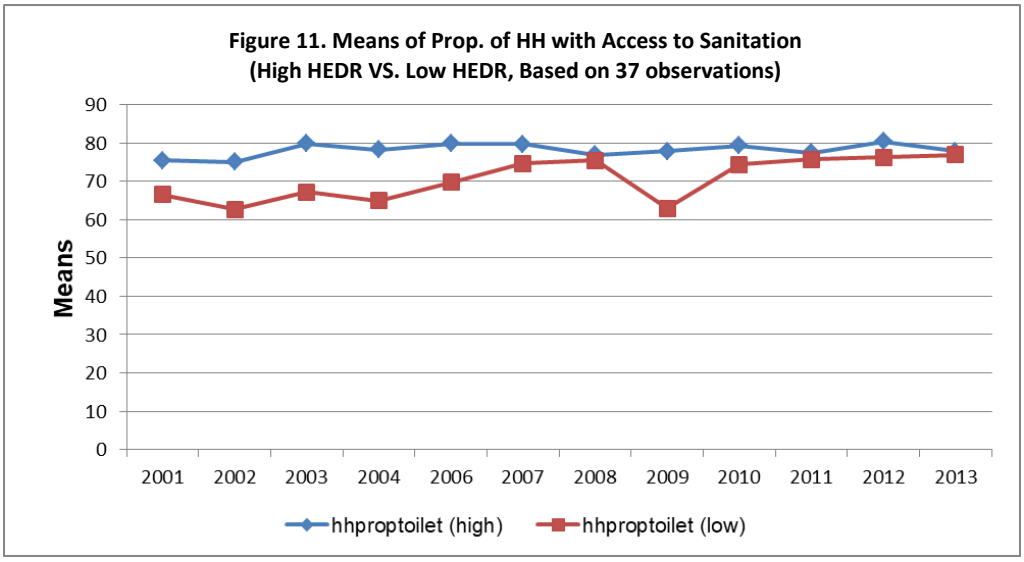
	Average	Means								Average
	2001-04	2006	2007	2008	2009	2010	2011	2012	2013	2006-2013
Hospital bed capacity (Control)	3.03	2.93	2.94	2.90	2.96	2.97	2.97	3.01	2.41	2.88
Hospital bed capacity (Treatment)	5.87	5.57	5.74	5.51	5.04	5.72	5.10	5.10	4.82	5.33
Access to safe water (Control)	78.34	79.10	81.92	83.45	79.16	85.27	80.58	75.48	86.09	81.38
Access to safe water (Treatment)	86.47	85.29	85.66	83.73	88.94	87.63	87.31	72.11	86.90	84.69
Access to sanitation (Control)	65.35	69.70	74.67	75.41	62.91	74.34	75.67	76.21	76.92	73.23
Access to sanitation (Treatment)	77.14	79.79	79.71	76.87	77.79	79.33	77.43	80.36	77.87	78.64
Control Group (Low HEDR)	86.94	94.47	92.77	82.88	73.35	79.61	54.07	53.95	67.14	74.78
Treatment Group (High HEDR)	92.17	96.58	93.94	84.02	76.93	86.46	68.78	59.72	78.50	80.62

	Average	Change relative to baseline (2001-2004)								Average
	2001-04	2006	2007	2008	2009	2010	2011	2012	2013	2006-2013
Hospital bed capacity (Control)	-0.02	-0.03	-0.03	-0.05	-0.03	-0.02	-0.02	-0.01	-0.21	-0.05
Hospital bed capacity (Treatment)	-0.01	-0.05	-0.02	-0.06	-0.14	-0.03	-0.13	-0.13	-0.18	-0.09
Access to safe water (Control)	0.02	0.01	0.05	0.07	0.01	0.09	0.03	-0.04	0.10	0.04
Access to safe water (Treatment)	0.01	-0.01	-0.01	-0.03	0.03	0.01	0.01	-0.17	0.00	-0.02
Access to sanitation (Control)	-0.01	0.07	0.14	0.15	-0.04	0.14	0.16	0.17	0.18	0.12
Access to sanitation (Treatment)	0.01	0.03	0.03	0.00	0.01	0.03	0.00	0.04	0.01	0.02
Control Group (Low HEDR)	0.08	0.09	0.07	-0.05	-0.16	-0.08	-0.38	-0.38	-0.23	-0.14
Treatment Group (High HEDR)	0.04	0.05	0.02	-0.09	-0.17	-0.06	-0.25	-0.35	-0.15	-0.13



On the average, the proportion of households with access to safe water (i.e., 85 percent vis-à-vis 81percent) and sanitation (i.e., 79 percent vis-à-vis 73 percent) is higher for the treatment group as compared to that for the control group (Figures 10 and 11). However, the improvement in access to sanitation is remarkable for the control group (i.e., 12 percent, on the average) in 2006-2013 as compared to the treatment group, which posted only about 2 percent (Table 5).





4. Analysis of Results

With reference to the econometric model given by Equation (1) below, the parameters are interpreted in the DID framework as follows. β_0 is the average output of the control group in the baseline period 2001-2004. The parameter δ_0 captures the changes in the output of all LGUs from baseline period to 2013, except 2005. β_1 captures the effect on output of the treatment group due to higher degree of health decentralization. δ_1 is the difference-in-differences estimator that measures the impact of the degree of health decentralization on output (Figure 1).

$$y = \beta_0 + \delta_0 after04dum + \beta_1 treatdum + \delta_1 treat\_after04 + \alpha X \qquad (1)$$

Table 6a and Table 6b present the estimates of the impact of higher degree of health decentralization (or greater health decentralization) on access to hospital inpatient services. Based on Table 6a, greater health decentralization has no impact on access to hospital inpatient services. On the other hand, the coefficients of revenue decentralization indicators (i.e., proportion of own-source revenue to either LGU expenditure or income) suggest that revenue decentralization has slight negative effect (i.e., 0.04) on access to hospital inpatient services. In this sense, greater revenue decentralization implies lower level of access to hospital inpatient services.

On the contrary, increase in the share of health spending to LGU spending and real per capita LGU income improves the access to hospital to inpatient services. After controlling for heterogeneity across LGUs, the impact of higher degree of health decentralization on access to hospital inpatient services is found to be negative. It implies that LGUs with greater health decentralization have lower level of access to hospital inpatient services (i.e., by about 0.31 or 0.26) relative to LGUs with lesser health decentralization based on the three models shown in Table 6b.

Table 6a. Results of DID method based on dataset1
Variable of interest: Access to hospital inpatient services

	(1)		(2)		(3)	
after04dum	-0.0891		-0.1760		-0.3050	
	(0.3090)		(0.2240)		(0.2250)	
treatdum	3.5680	***	1.2800	***	1.2670	***
	(0.3570)		(0.2730)		(0.2750)	
treat_aftr04	-0.3160		-0.1940		-0.1550	
	(0.4370)		(0.3120)		(0.3140)	
Share of health			0.2690	***	0.2720	***
to LGU spending			-0.0199		-0.0200	
Real per capita			0.000893	***	0.000885	***
LGU income			(0.0000467)		(0.0000473)	
Proportion of			-0.0381	***		
own-source revenue			-0.0067			
to total LGU spending						
Proportion of					-0.0418	***
own-source revenue					-0.0081	
to total LGU income						
Constant	2.7970	***	-1.1160	**	-1.1360	**
	(0.2520)		(0.3640)		(0.3740)	
N	648		648		648	
R-sq	0.2940		0.645		0.642	

Standard errors in parentheses
* p<0.05, ** p<0.01, ***
p<0.001

Table 6b. Results of DID method based on dataset1
Variable of interest: Access to hospital inpatient services

	(1)		(2)		(3)	
after04dum	-0.2010		0.0607		0.0767	
	(0.1550)		(0.1560)		(0.1560)	
treatdum	1.8560	***	5.8230	***	5.7870	***
	(0.3120)		(0.3610)		(0.3630)	
treat_aftr04	-0.3160	*	-0.2600	*	-0.2630	*
	(0.1230)		(0.1260)		(0.1270)	
Share of health to LGU spending			0.0112		0.0095	
			(0.0127)		(0.0127)	
Real per capita LGU income			-0.0000980		-0.0000965	
			(0.0000570)		(0.0000570)	
Proportion of own-source revenue to LGU spending			0.0082			
			(0.00875)			
Proportion of own-source revenue to LGU income					-0.0002	
					(0.0107)	
Constant	5.274	***	1.47	***	1.553	***
	(0.237)		(0.281)		(0.295)	
N	648		648		648	
R-sq	0.949		0.950		0.950	
Province effects[1]	/		/		/	
Year effects[1]	/		/		/	

Standard errors in parentheses

* p<0.05, ** p<0.01, *** p<0.001

[1] results not displayed due to space consideration

Table 7a and Table 7b show the estimates of the impact of greater health decentralization on health facility-based delivery. As indicated by the coefficient of the interaction term, treat_aftr04dum in Table 7a, health decentralization has no impact on health facility-based delivery. On the other hand, the coefficients of revenue decentralization indicators suggest that revenue decentralization has positive impact on health facility-based delivery. It means that greater revenue decentralization results in higher percentage of births attended in health facilities.

Likewise, increase in real per capita LGU income implies increase in health facility-based delivery. In contrast, only real per capital LGU income is found to have positive effect on health facility-based delivery after controlling for heterogeneity. Like in the model without fixed effects, greater health decentralization has no impact on the same (Table 7b).

Table 7a. Results of DID method based on dataset1 Variable of interest: Health facility-based delivery

	(1)		(2)		(3)	
after04dum	23.840	***	18.890	***	20.590	***
	(2.412)		(2.208)		(2.251)	
treatdum	2.616		0.312		0.205	
	(2.785)		(2.687)		(2.752)	
treat_aftr04	0.775		-0.793		-1.296	
	(3.411)		(3.074)		(3.145)	
Share of health to LGU spending			0.2240		0.1100	
			(0.1960)		(0.2000)	
Real per capita LGU income			0.00506	***	0.00503	***
			(0.000460)		(0.000474)	
Proportion of own-source revenue to LGU spending			0.516	***		
			(0.066)			
Proportion of own-source revenue to LGU income					0.442	***
					(0.081)	
Constant	22.730	***	2.078		5.595	
	(1.969)		(3.578)		(3.748)	
N	648		648		648	
R-sq	0.242		0.396		0.367	

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 7b. Results of DID method based on dataset1
Variable of interest: Health facility-based delivery

	(1)		(2)		(3)	
after04dum	43.870	***	4.592	*	4.294	*
	(2.056)		(2.072)		(2.062)	
treatdum	-17.010	***	19.780	***	20.140	***
	(4.148)		(4.785)		(4.806)	
treat_aftr04	0.775		-0.047		0.038	
	(1.634)		(1.674)		(1.677)	
Share of health to LGU spending			-0.062		-0.040	
			(0.169)		(0.168)	
Real per capita LGU income			0.00192	*	0.00190	*
			(0.000755)		(0.000756)	
Proportion of own-source revenue to LGU spending			-0.147			
			(0.116)			
Proportion of own-source revenue to LGU income					-0.063	
					(0.142)	
Constant	45.53	***	3.022		2.298	
	(3.153)		(3.720)		(3.907)	
N	648		648		648	
R-sq	0.843		0.845		0.845	
Province effects[1]	/		/		/	
Year effects[1]	/		/		/	

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001
[1] results not displayed due to space consideration

Table 8a and 8b present the estimates of the impact of higher degree of health decentralization on access to hospital inpatient services based on 37 observations. Based on model (2) in Table 8a, greater health decentralization has negative effect on access to hospital inpatient services. Similarly, greater revenue decentralization has slight negative effect (i.e., 0.04) on access to hospital inpatient services, which is consistent with the findings based on 54 observations. On the contrary, increase in the share of health to LGU spending and real per capita income induces improvement in the level of access to hospital inpatient services.

Table 8a. Results of DID method based on dataset2
Variable of interest: Access to hospital inpatient services

	(1)		(2)		(3)	
after04dum	-0.149		-0.214		-0.321	
	(0.345)		(0.276)		(0.272)	
treatdum	2.837	***	1.200	***	1.185	***
	(0.404)		(0.334)		(0.334)	
treat_aftr04	-0.396		-0.784*		-0.744	
	(0.495)		(0.379)		(0.379)	
Share of health to LGU spending			0.164	***	0.166	***
			(0.0259)		(0.0258)	
Real per capita LGU income			0.000836	***	0.000827	***
			(0.0000511)		(0.0000516)	
Proportion of own-source revenue to LGU spending			-0.0369	**		
			(0.0121)			
Proportion of own-source revenue to LGU income					-0.044	**
					(0.015)	
Constant	3.034	***	0.262		0.299	
	(0.282)		(0.472)		(0.481)	
N	444		444		444	
R-sq	0.220		0.548		0.547	

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 8b. Results of DID method based on dataset2
Variable of interest: Access to hospital inpatient services

	(1)		(2)		(3)	
after04dum	0.0146		-0.0321		-0.0080	
	(0.183)		(0.185)		(0.183)	
treatdum	1.910	***	5.371	***	3.856	***
	(0.312)		(0.561)		(0.335)	
treat_aftr04	-0.396	**	-0.320	*	-0.333	*
	(0.146)		(0.147)		(0.146)	
Share of health to LGU spending			0.0168		0.0128	
			(0.0152)		(0.0151)	
Real per capita LGU income			-0.000197	**	-0.00021	***
			(0.0000613)		(0.0000615)	
Proportion of own-source revenue to LGU spending			0.0071			
			(0.0126)			
Proportion of own-source revenue to LGU income					-0.0234	
					(0.0156)	
Constant	5.321	***	2.324	***	4.100	***
	(0.243)		(0.630)		(0.366)	
N	444		444		444	
R-sq	0.939		0.941		0.941	
Province effects[1]	/		/		/	
Year effects[1]	/		/		/	

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001
[1] results not displayed due to space consideration

Controlling for heterogeneity yields same results for the effect of greater health decentralization (i.e., negative) on access to hospital inpatient services as those for models presented in Table 6b (i.e., based on 54 observations). Nevertheless, the disparity in the levels of access to hospital inpatient services between the treatment group and the control group is more pronounced in this case (i.e., 0.39, 0.32, and 0.33 for models 1-3, respectively in Table 8b) compared to that in the case of 54 observations (i.e., 0.31, 0.26. and 0.26 for models 1-3, respectively in Table 6b). In addition, increase in real per capita income implies lower level of access to hospital inpatient services.

Tables 9a and 9b show the estimates of the impact of higher degree of health decentralization on households' access to safe water based on 37 observations. It can be gleaned from Table 9a that greater health decentralization has no effect on access to safe water. Increase in the share of health spending to LGU spending implies lesser proportion of households with access to safe water. On the contrary, increase in real per capita LGU income means better access to safe water.

Controlling for heterogeneity did not obtain significant results except for the constant, which is the average proportion of households with access to safe water for the control group in the baseline period 2001-2004 and the treatment dummy variable, which is the effect on output for the treatment group in 2001-2013, except 2005 due to data unavailability (Table 9b).

Table 9a. Results of DID method based on dataset2
Variable of interest: Access to safe water

	(1)		(2)		(3)	
after04dum	3.038		0.782		0.666	
	(2.148)		(2.199)		(2.163)	
treatdum	8.130	**	9.226	***	9.463	***
	(2.515)		(2.659)		(2.661)	
treat_aftr04	-4.817		-5.157		-5.153	
	(3.080)		(3.019)		(3.015)	
Share of health to LGU spending			-0.576	**	-0.553	**
			(0.207)		(0.206)	
Real per capita LGU income			0.00134	**	0.00141	***
			(0.000407)		(0.000411)	
Proportion of own-source revenue to LGU spending			-0.001			
			(0.096)			
Proportion of own-source revenue to LGU income					0.0934	
					(0.1150)	
Constant	78.340	***	83.270	***	81.510	***
	(1.754)		(3.759)		(3.824)	
N	444		444		444	
R-sq	0.031		0.079		0.081	

Standard errors in parentheses
* p<0.05, ** p<0.01, ***p<0.001

Table 9b. Results of DID method based on dataset2
Variable of interest: Access to safe water

	(1)	(2)	(3)
after04dum	8.152 *	4.061	3.822
	(3.212)	(3.299)	(3.252)
treatdum	16.27 **	12.600	23.470 ***
	(5.471)	(9.986)	(5.956)
treat_aftr04	-4.817	-4.237	-4.118
	(2.564)	(2.612)	(2.590)
Share of health to LGU spending		-0.1090	-0.0562
		(0.271)	(0.268)
Real per capita LGU income		-0.00175	-0.00156
		(0.00109)	(0.00109)
Proportion of own-source revenue to LGU spending		-0.0483	
		(0.224)	
Proportion of own-source revenue to LGU income			0.382
			(0.278)
Constant	70.070 ***	82.030 ***	67.390 ***
	(4.267)	(11.210)	(6.505)
N	444	444	444
R-sq	0.397	0.401	0.404
Province effects[1]	/	/	/
Year effects[1]	/	/	/

Standard errors in parentheses
* p<0.05, ** p<0.01, ***
p<0.001
[1] results not displayed due to space consideration

Table 10a and Table 10b present the estimates of the impact of greater health decentralization on households' access to sanitation or toilet based on 37 observations. All three models in Table 10a indicate that higher degree of health decentralization has negative impact on access to sanitation. The difference in such access between the treatment group and the control group is about 6 percent based on models (1) and (2) while it is about 7 percent based on model (3).

Table 10a. Results of DID method based on dataset2
Variable of interest: Access to sanitation

	(1)		(2)		(3)	
after04dum	7.879	***	1.558		3.051	
	(2.097)		(1.937)		(1.898)	
treatdum	11.790	***	16.060	***	16.380	***
	(2.454)		(2.342)		(2.335)	
treat_aftr04	-6.376	*	-6.203	*	-6.787	*
	(3.006)		(2.660)		(2.646)	
Share of health to LGU spending			-0.975	***	-0.996	***
			(0.182)		(0.180)	
Real per capita LGU income			0.00231	***	0.00247	***
			(0.000358)		(0.000360)	
Proportion of own-source revenue to LGU spending			0.533	***		
			(0.0846)			
Proportion of own-source revenue to LGU income					0.673	***
					(0.101)	
Constant	65.350	***	65.260	***	63.960	***
	(1.712)		(3.312)		(3.356)	
N	444		444		444	
R-sq	0.089		0.294		0.301	

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

In contrast, the estimators on revenue decentralization indicators suggest positive impact of fiscal decentralization on access to sanitation. Likewise, real per capita LGU income improves access to sanitation. On the contrary, increase in the share of health spending to LGU spending reduces significantly the proportion of households with access to sanitation. Controlling for heterogeneity validates the negative impact of greater health decentralization on access to sanitation. The disparity between the treatment group and the control group is about 6 percent based on all models (Table 10b).

Table 10b. Results of DID method based on dataset2
Variable of interest: Access to sanitation

	(1)		(2)		(3)	
after04dum	8.983	***	6.378	*	6.593	*
	(2.576)		(2.653)		(2.611)	
treatdum	7.854		9.697		32.110	***
	(4.388)		(8.029)		(4.783)	
treat_aftr04	-6.376	**	-6.208	**	-6.346	**
	(2.057)		(2.100)		(2.080)	
Share of health to LGU spending			-0.00281		0.01520	
			(0.218)		(0.215)	
Real per capita LGU income			0.000155		0.000316	
			(0.00088)		(0.00088)	
Proportion of own-source revenue to LGU spending			0.155			
			(0.180)			
Proportion of own-source revenue to LGU income					0.427	
					(0.223)	
Constant	69.390	***	66.450	***	41.360	***
	(3.423)		(9.015)		(5.224)	
N	444		444		444	
R-sq	0.617		0.618		0.621	
Province effects[1]	/		/		/	
Year effects[1]	/		/		/	

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001
[1] results not displayed due to space consideration

5. Concluding Remarks

The findings of the DID analysis suggest that there is no evidence of positive impact of greater health decentralization on health services such as access to sanitation (toilet) and access to hospital inpatient services. The parameter of interest in the DID framework (i.e., the interaction term, treat_afterdum) consistently obtains negative values, thus implying the negative impact of higher degree of health decentralization on access to sanitation and the level of access to hospital inpatient services. In the case of the treatment group, on the average, the proportion of households with access to sanitation and the level of access to hospital inpatient services declined between 2006 and 2013.

Such findings contradict the hypothesis of the study that greater health decentralization results in better health services. Nevertheless, Diokno (2012, p.21) argues that although there are success stories of some local government units, "they are more an exception rather than the rule." Also, the findings are consistent with the narrative in the literature on the effect of health decentralization on hospitals. The LGUs incurred lower province-level expenditure on hospitals due to the mismatch between the cost of the devolved hospitals and the internal revenue allotment (IRA) transferred to the LGUs (DOH 1999). Such negative effect has remained over the years as recognized in the Administrative Order (AO) No. 2010-0036. The said document underscores the neglect of public hospitals and health facilities due to inadequate health budget for expanding capacity and improving quality of services.

Even Solon and Herrin (2017) argue that LGUs failed to maintain and upgrade devolved facilities. To address the issue, the DOH initiated the Health Facilities Enhancement Program (HFEP) which is meant to upgrade health facilities (i.e., priority barangay health stations and rural health units, government hospitals and health facilities in the provinces) and provide training to health professionals with the end in view of improving access to quality health care. Such program entails huge funding, thus causing the DOH spending at the province level to rise, not to mention the other DOH initiatives intended to augment the LGUs' meager resources.

The increasing share of DOH spending at the province level certainly diminishes the health expenditure decentralization ratio (HEDR) and in practical terms, it weakens health devolution. Based on 54 observations, the average HEDR for the control group in the post-treatment period is 76 percent, which is lower than the average HEDR of 87 percent in the pre-treatment period. For the treatment group, it is 80 percent in the post-treatment period, thus lower than the pre-treatment average of 93 percent. The same pattern can be observed in the dataset with 37 observations.

This might appear as creeping renationalization but Section 17f of the Local Government Code allows DOH to "provide or augment the basic services and facilities assigned to a lower level of local government unit when such services or facilities are not made available or, if made available, are inadequate to meet the requirements of its inhabitants." Such provision encourages the existence of two-track delivery system, which creates confusion, weakens accountability between levels of government, and promotes inefficiencies in the health system. It should be reviewed and amended to minimize or at best, avert unintended consequences.

The declining HEDR weakens the power of the Oates' Decentralization Theorem in predicting improvement in health service delivery. The DID analysis fails to establish the impact of health devolution on health facility-based delivery. This can be attributed to the fact that the DOH

fully funded (i) the upgrading of priority barangay health stations and rural health units, i.e., nearest to the communities, to provide Basic Emergency Obstetrical and Neonatal Care (BEmONC), with the end in view of reducing maternal mortality ratio by encouraging women to give birth in strategically located BEmONC facilities; and (ii) the upgrading of LGU hospitals to provide Comprehensive Emergency Obstetrical and Neonatal Care (CEmONC), with the end in view of preventing congestion of large tertiary hospitals (Manasan and Cuenca 2010b; DOH AO 2009-0084; DOH 2009). However, the DOH and LGUs share the cost of BEmONC and CEmONC trainings.

While the study argues that the better measure of fiscal decentralization affecting the health sector (or in short, health devolution) is the health expenditure decentralization ratio, it recognizes the findings on the parameter of the revenue decentralization indicators. Like higher degree of health decentralization, greater revenue decentralization has negative effect on the level of access to hospital inpatient services. Thus, fiscal decentralization, from both expenditure and income side, did not improve access to hospital inpatient services. Given budget constraints, LGUs most likely prioritize services that require less financial resources. They can rely on HFEP for upgrade of their hospitals.

In contrast, greater revenue decentralization has positive effect on access to sanitation and health facility-based delivery. The favorable results in the case of access to sanitation are consistent with the anecdotal evidences that some LGUs, through their local chief executives, exercise their autonomy in favor of access to sanitation (toilet) by distributing toilet bowls to their constituents out of their discretionary fund. As regards health facility-based delivery, the findings suggest that higher share of own-source revenue to total income (or expenditure) increases the percentage of births attended in health facilities. It is possible that some portion of own-source revenues is translated into spending for maintaining devolved health facilities.

The effect of real per capita LGU income on the access to hospital inpatient services appears to be inconclusive because the findings are mixed depending on the inclusion/exclusion of fixed effects. Without fixed effects, real per capita LGU income induces improvement in access to hospital inpatient services. On the contrary, its effect on the same becomes negative when fixed effects are controlled for. The study argues that the real effect of this variable is more robust when heterogeneity of the LGUs is considered.

So why would increase in real per capita LGU income have negative effect on access to hospital inpatient services? It is possible that despite increase in real per capita LGU income, spending shifts away from maintaining hospitals to less costly LGU priorities. Higher real per capita income does not necessarily mean more funding for hospital services, especially when LGUs have HFEP to depend on. In contrast, it brings about better health facility-based delivery and access to water and sanitation. Further, an increase in the share of health spending to the total LGU spending enhances access to hospital inpatient services. On the contrary, it does not necessarily imply better access to safe water and sanitation because of competing health spending priorities of the LGUs.

In sum, the negative effect of greater health decentralization on access to hospital inpatient services and access to sanitation is counterintuitive as economic literature on fiscal federalism identifies improved service delivery as one of the potential benefits of fiscal decentralization. Nevertheless, the literature offers explanation as to why fiscal decentralization fails or succeeds in delivering the expected gains. For instance, Ghuman and Singh (2013, p.7) argue that the impact of decentralization on public service delivery depends on the design of the

decentralization policy, among others. In particular, decentralization should be "accompanied with sound financial resource base of local governments, full autonomy to local governments in HRM matters, regular capacity building of local officials, performance based incentive structures, and participatory governance."

Sound financial resource base refers to the LGUs' capacity to generate revenues. Based on the Local Government Code of 1991, the provinces have weak taxing power but at the same time, they have the immense responsibility of maintaining and operating provincial hospitals, which is associated with huge financial requirement.
In this regard, it is critical to revisit and amend the taxing power of the provinces.

Also, it is deemed important to review and revise the IRA distribution formula to address the mismatch between the cost of devolved health facilities (particularly hospitals) and available LGU resources, which is a long-standing issue for majority of the LGUs. This call becomes more crucial in the light of the recent development on the Supreme Court's ruling on IRA that mandates the computation of the IRA share of LGUs on the basis of all national government tax revenues, instead of the current basis (i.e., the revenues collected by the Bureau of Internal Revenue). Such ruling is expected to take effect in 2022.

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Annex Table 1. Provinces covered in the study (54 observations)
Variables of interest: hospital bed capacity per 10,000
population and health facility-based delivery

Control Group			Treatment Group		
1	CAR	Benguet	1	CAR	Abra
2	Region I	Pangasinan	2	CAR	Apayao
3	Region II	Cagayan	3	CAR	Ifugao
4	Region II	Isabela	4	CAR	Kalinga
5	Region II	Nueva Vizcaya	5	CAR	Mt. Province
6	Region III	Bataan	6	Region I	Ilocos Norte
7	Region III	Bulacan	7	Region I	Ilocos Sur
8	Region III	Nueva Ecija	8	Region I	La Union
9	Region III	Pampanga	9	Region II	Batanes
10	Region III	Tarlac	10	Region II	Quirino
11	Region IV-A	Batangas	11	Region III	Aurora
12	Region IV-A	Cavite	12	Region III	Zambales
13	Region V	Albay	13	Region IV-A	Laguna
14	Region V	Camarines Sur	14	Region IV-A	Quezon
15	Region V	Masbate	15	Region V	Camarines Norte
16	Region VI	Capiz	16	Region V	Catanduanes
17	Region VI	Iloilo	17	Region V	Sorsogon
18	Region VII	Cebu	18	Region VI	Aklan
19	Region VIII	Biliran	19	Region VI	Antique
20	Region VIII	Leyte	20	Region VI	Guimaras
21	Region VIII	Western Samar	21	Region VI	Negros Occidental
22	Region IX	Zamboanga Del Norte	22	Region VII	Negros Oriental
23	Region IX	Zamboanga Sibugay	23	Region VII	Siquijor
24	Region XII	North Cotabato	24	Region VIII	Eastern Samar
25	Region XII	Sultan Kudarat	25	Region VIII	Northern Samar
26	CARAGA	Agusan Del Sur	26	Region VIII	Southern Leyte
27	CARAGA	Surigao Del Norte	27	CARAGA	Agusan Del Norte

Annex Table 2. Provinces covered in the study (37 observations)
Variables of interest: proportion of households with access to safe water and sanitation and hospital bed capacity per 10,000 population

	Control Group			Treatment Group	
1	CAR	Benguet	1	CAR	Ifugao
2	Region I	Pangasinan	2	CAR	Abra
3	Region II	Isabela	3	Region I	Ilocos Sur
4	Region II	Nueva Vizcaya	4	Region I	La Union
5	Region III	Nueva Ecija	5	Region II	Batanes
6	Region III	Bulacan	6	Region II	Quirino
7	Region III	Tarlac	7	Region II	Cagayan
8	Region III	Pampanga	8	Region III	Zambales
9	Region V	Masbate	9	Region III	Aurora
10	Region V	Camarines Sur	10	Region V	Catanduanes
11	Region VIII	Leyte	11	Region V	Sorsogon
12	Region VIII	Western Samar	12	Region V	Camarines Norte
13	Region X	Misamis Oriental	13	Region VII	Bohol
14	Region X	Bukidnon	14	Region VIII	Eastern Samar
15	Region X	Lanao Del Norte	15	Region VIII	Northern Samar
16	Region XII	Sultan Kudarat	16	Region VIII	Biliran
17	CARAGA	Surigao Del Sur	17	Region X	Camiguin
18	CARAGA	Agusan Del Sur	18	CARAGA	Agusan Del Norte
19	CARAGA	Surigao Del Norte			