Early Impacts of Capitation Payment Reform on the Human Resources for Health of the Public Primary Health System in Indonesia: A Propensity Score Matching and Difference-in-Difference Analysis

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Abstract

Indonesia has launched massive waves of health reforms in the past decade aiming to increase health access to a wider population, with the National Health Insurance reform (JKN) unveiled in 2014 arguably one of the most high profile policy reform in the country's health reform history, and the largest unified social health insurance scheme in the world to date. One of the most important health reforms alongside the JKN is the departure of provider payment system from a retrospective payment system that reimburses health providers based on volume of services, to a population-based prospective payment system that entrusts health providers with a lump sum grant, paid in advance based on the enrolment rate. In Indonesia, capitation payment endowed to the primary health providers has ushered in additional resources for community health centres (CHCs), allowing more operational leverage to the CHCs' managers in resource allocations. Capitation payment is seen as an effective tool to manage health costs consequent to the expansion of health access in many developing countries. While it is established that capitation payment is likely to promote cost efficiency, what is less understood in the literature is its effects on the human resource capacity at the supply-side of health care. This paper evaluates the early impacts of the capitation payment system to the human resource supply of CHCs in Indonesia by combining propensity score matching and difference-in-difference analysis in the empirical model. My findings show that capitation payment reform resulted in significant increase of total full-time equivalent (FTE) contracted staff and total part-time equivalent (PTE) contracted staff among CHCs in the urban regions. Similar patterns were not observed among CHCs in the rural regions. There were no substitution effects found on FTE and PTE permanent staff. Findings are consistent with the applications of several robustness checks. There exists urban-rural inequity in terms of distribution of contracted health workers in Indonesia as a result of capitation payment. This should raise alarms to policy makers as Indonesia progresses towards its ambitious policy goal of universal health coverage by 2019.

Keywords: Capitation, Indonesia, Propensity Score Matching, Difference-in-Difference, Human Resources in Health

Introduction

With rising health expenditures becoming a grave concern to governments grappling to maintain fiscal space for health consequent to the expansion of health coverage (Durairaj and Evans 2010), many developing countries are considering reforms of provider payment methods as means to alter the incentives of health providers in their quests to contain healthcare costs (Yip et al. 2010; Nguyen et al. 2017; Mills et al. 2000). In the health economics literature, it has been established that a retrospective provider payment method, which reimburses health providers based on the actual volume of activities or services rendered such as fee-for-service, often results in cost escalation and medical wastage as compared to prospective provider payment method such as capitation payment, diagnostic-related groups (DRG) or case-based payment (Barnum, Kutzin, and Saxenian 1995; Jegers et al. 2002; Roberts et al. 2008; Blomqvist 2011). Capitation payment – a population-based system that reimburses health providers with fixed payment per covered life within a defined period - is often aimed at meeting the health needs of a broad population while ensuring that health cost is kept efficient (Porter and Kaplan 2016; Roberts et al. 2008; Blomqvist and Busby 2012). Nevertheless, there are trade-offs such as cream-skimming and patient selection. Cream-skimming and patient selection are characterised by making deliberate decisions to treat patients of certain features other than their need for care in order to maximise the profits of health facilities (Mills et al. 2000; Roberts et al. 2008). These are perverse incentives that are prone to occur in prospective payment systems such as capitation in providers' attempt to reduce cost and avoid budget overrun (Mills et al. 2000; Roberts et al. 2008).

Previous studies of capitation payment system reform in other countries have shown that when payment rules are negotiated between payer and provider in advance, capitation has the potential to result in cost containment (Carrin and Hanvoravongchai 2003; Nguyen et al. 2017; Yip et al. 2001) and reduced utilisation of expensive drugs and health technologies (Hirunrassamee and Ratanawijitrasin 2009; Yip et al. 2001). However, what has remained less understood and poorly documented in the literature about capitation payment is its impact on the human resource capacity at the supply-side of health care. In the context of Indonesia, capitation payment reform has ushered in additional resources for community health centres on top of the existing fee-for-service transfers from the central and provincial government (Mboi 2015; Tandon et al. 2016). This reform is postulated to allow more operational leverage to the managers of public primary health facilities when making decisions on resource allocations (Mboi 2015; Tandon et al. 2016). One particular aspect of operational decisions that could be affected by the boost in financial resources is human resources for health. Examining the impact of capitation payment system on human resources for health is of significant concern to maturing health systems in developing countries, as these systems are generally less equipped with the health worker supply needed to deliver optimal care to the population (Wyss 2004).

In Indonesia, provider payment systems have been recognised as policy tools that could influence health system performance and directly affect the quality of care, incentives of health care providers and behaviours of health care workers (Rokx et al. 2010). While this notion is very much aligned with the conventional wisdom in the health economics literature, what is more imminent after provider payment reforms is their impacts on the human resource supply within the Indonesian health system. The nation-wide capitation payment reform introduced in Indonesia in 2014 is significant

in the health reform history of Indonesia, given that the capitation grant now endows most public primary health facilities (more commonly known as community health centres, CHCs hereafter) with additional resources to improve their service delivery and operational capacity.[3] Even though in a theoretical sense, a capitation payment system would incentivise cost containment behaviours and improve efficiency (Carrin and Hanvoravongchai 2003; Blomqvist 2011; Blomqvist and Busby 2012), in Indonesia, this impact may be less compelling at the early stage of the capitation payment implementation. This is because the supply-side of the health system in Indonesia remains deficient to serve the population health needs despite the steady increase of public health facilities over the last two decades. For instance, physician to population ratio in Indonesia is still way below the World Health Organisation's recommendation, while the CHCs to population ratio is also way below its neighbours in the Southeast Asian region (Mahendradhata et al. 2017). This context suggests that capitation payment reform in Indonesia may not conform to the standard predictions of prospective payment theory established in the health economics literature at the early stage of reform. Quite the contrary, capitation payment reform in Indonesia could potentially increase health expenditure of the public health facilities, besides ushering in other mechanism to induce positive effects on human resources for health at the supply-side of the health system that is unique to Indonesia. Indeed, capitation payment reform launched after the JKN roll out in 2014 has increased the autonomy of health providers in deciding how best these additional resources are to be allocated to increase health care delivery capacity (Mboi 2015).[4]

In this paper, I analysed the early impacts of capitation payment system on the human resource supply of CHCs, which are also the public primary health providers in Indonesia. The findings show that capitation payments led to greater autonomy to CHCs to recruit more contracted health workers as compared to CHCs that did not receive capitation payments. I also determined if capitation payments have an impact in terms of the recruitment of permanent health workers that are on civil service payroll. I further investigated if CHCs' autonomy to recruit more contracted health workers has a substitution effect that resulted in other trade-offs such as reduction of the number of permanent health workers, whose headcount are mainly under the district or central government purview. The overall findings shed light to the potential benefits and pitfalls of capitation payment reform in the context of a large developing country with extreme resource heterogeneities at the early stage of payment system reform. Given that large developing countries such as Indonesia have been historically saddled with supply-side issue such as shortage of well-trained health workers in the public health system (Rokx et al. 2010; Johar 2010), the findings from this study generate reflective insights for other maturing health systems with regard to the degree to which a payment system reform can alter the human resources pool when the baseline is low.

The next section of this paper introduces the context of capitation payment reform in Indonesia. This is followed by explanation of the data, variables and empirical strategy in the methods section. The findings reports the main analysis and robustness checks. I explain several limitations of the data and empirical strategy in

[3] President's Decree No. 32/2014 on the Operation and Utilisation of Capitation Payment at Public Primary Health facilities; Ministry of Health Regulation No. 69/2013 on the health-services tariff of primary and advanced health facilities; Ministry of Health Regulation No. 19/2014 on the Utilisation

[4] This observation is corroborated by information gathered from key informant interviews with CHC managers and local health bureaucrats in three districts of Indonesia from February till April 2017.

the discussion section. This paper concludes with policy implications and suggests possible directions that future research endeavours could take.

The Context of Capitation Payment Reform in Indonesia

In line with the January 2014 National Health Insurance reform in Indonesia, a capitation payment system was formalised as the primary mode of provider payment to all primary health facilities that register with the third-party payer – BPJS-Health. Capitation payment is a prospective payment grant paid monthly by BPJS-Health to all public and private primary health providers with which it contracts, based on the number of registered enrolees in each health facility. Besides capitation payments, most CHCs are receiving other forms of supply-side financing in the form of subsidies and grants from the district government and central government (Mahendradhata et al. 2017; Tandon et al. 2016). As a highly decentralised country with more than 500 districts, local district governments in Indonesia are endowed with decision-making and implementation autonomy in a variety of public service delivery domains, including heath service delivery (Kristiansen and Santoso 2006). As CHCs started receiving substantial capitation grants from BPJS-Health, many district governments became increasingly involved in regulating the management and utilisation of these capitation grants. In particular, district-level regulations were enacted to endow more autonomy to the providers to decide on the utilisation of capitation grants to increase CHCs' capacities in health service delivery. These autonomy enhancing regulations include allowing CHC managers to determine the performance incentive structure for the existing staff in a more flexible manner, and hiring more contracted health workers in order to meet the rising demand in health care as a result of National Health Insurance expansion.[5]

Table 1: Design components and characteristics of capitation payment system in Indonesia

Design components	Characteristics
Allocation and disbursement	• Disbursed on the 15th of every month to primary health facilities that contract with BPJS-Health.
Base rate calculation	• Base rate is calculated based on the public/private nature of primary health facility and their strengths on human resources in health. • No risk adjustment mechanism. • There is a provision of special capitation base rate for geographically depressed areas. • There exists special compensation mechanisms for districts or areas that are not adequately equipped with supply-side health resources.
Utilisation and apportionment	• 60% ought to be allocated for staff incentive while 40% ought to be allocated for operational activities based on the national regulation.

[5] Information gathered from key informant interviews with CHC managers and local health bureaucrats in three districts of Indonesia from February till April 2017. Information is corroborated with informal discussion with high level actors involved in policy planning and implementation of capitation payment in BPJS-Health and Ministry of Health in Indonesia in December 2016.

Monitoring and accountability	• Regular monitoring by District Health Office applies to CHCs only (private primary health facilities are not under the direct purview of District Health Office). • Setting up of anti-fraud task force, regular monitoring and evaluation system, clinical pathway, and clinical audit system as mechanisms of checks and balances were recommended at the district level. • Power endowed to Provincial Health Office and District Health Office to issue ultimatum, impose fine and revoke practice license in the event of malpractices and regulatory violations detected among the health providers.
Commitment based Capitation	• Started as policy pilot in 2016 and rollout nationally in all primary health facilities that contract with BPJS-Health since January 2017. • BPJS-Health employs three performance indicators to decide on the percentage of capitation grant allocation to primary health facilities. The percentage of capitation grant received by each primary health facility every quarter is determined by their respective performance in the previous quarter.

Note: Author's compilation using sources from various policy documents and government reports in Indonesia (see appendix).

Hypotheses

The first hypothesis in this paper was constructed from combination of information gathered from the literature and policy documents and primary fieldwork research in examining the implementation of capitation payment system by primary health providers. Both sources have suggested that capitation payments received by CHCs since 2014 served to enhance the internal resource pool of CHCs in the unique context of public primary healthcare in Indonesia. This additional source of funding to CHCs would increase the autonomy of capitated public providers in their hiring practice by allowing them more flexibility to recruit contracted health workers as an attempt to manage the inevitable increase in health demand as enrolment in the JKN scheme grows. Previous studies have indicated that the human resources for health in public health facilities such as CHCs had remained chronically inadequate to serve the burgeoning health needs of the population prior to the JKN reform (Johar 2010; Tandon et al. 2016; Mahendradhata et al. 2017). The increase in CHCs' autonomy and the dire situation in health worker supply would induce CHCs managers to recruit more contracted health workers as far as their human resources are concerned.

H1: *As capitation payment reform endowed CHCs with greater autonomy to contract more contracted health workers, the number of contracted health workers in capitated facilities is expected to be higher as compared to non-capitated facilities.*

Nevertheless, capitation payment reform is expected to have no consequence in influencing the number of existing government health workers who are on government payroll. More explicitly, it is expected that the number of permanent health workers – untargeted outcomes in the capitation payment reform – would largely remain as before. Thus, the second hypothesis is null in its formulation.

H2: *The number of permanent health workers who are on government payroll should remain as before the capitation payment reform.*

Methods

Data

The data for analysis were drawn from Indonesia Family Life Survey (IFLS) – a panel dataset commissioned by The RAND Corporation and Survey Meter. IFLS is an ongoing longitudinal socio-economic and health survey representing 83% of the Indonesian population living in 13 out of 26 provinces as of 2014. Besides collecting a wealth of information from individuals and households, IFLS also collected information from communities and various schools and health facilities within the communities (Strauss, Witoelar, and Sikoki 2016). The first wave of IFLS was conducted in 1993, followed by wave two in 1997, wave three in 2000, wave four in 2007 and the most recent wave in 2014 and 2015[6]. In this study, all five waves of IFLS data were used. The panel data were assembled by merging the community survey and public primary health facility survey in each wave of IFLS, before appending them across all five IFLS waves. In each community, an average of three public primary health facilities were surveyed. On average, 954 primary health facilities were surveyed in each IFLS wave. About 33% of this sample were covered in all IFLS waves (Frankenberg and Karoly 1995; Frankenberg and Thomas 2000; Strauss et al. 2004; Strauss et al. 2009; Strauss, Witoelar, and Sikoki 2016).

Variables

In this study, the unit of analysis is the primary health facility. There are two sets of key dependent variables in the analysis.

In the first set of analysis (shown in Tables 5.3 and 5.4), total number of full-time equivalent (FTE) and part-time equivalent (PTE) contracted health workers, number of FTE and PTE contracted nurses, number of FTE and PTE contracted midwives, as well as number of FTE and PTE contracted paramedics are the key dependent variables. The independent variable of interest is an interaction between *Capitation* (equals one if CHC receives any proportion of capitation grants in their annual health budgets) and *PostReform* (equals one for year 2015). Time-varying characteristics at the facility level (total number of FTE and PTE permanent staff) and community level (total households, presence of piped drinking water, percentage of households with electricity supply, presence of asphalt road and region) were also included as covariates.

In the second set of analysis (shown in Tables 5.5 and 5.6), total number of FTE and PTE permanent health workers, number of FTE and PTE GPs, number of FTE and PTE dentists, number of FTE and PTE nurses, number of FTE and PTE midwives, number of FTE and PTE paramedics are the key dependent variables. The independent variable of interest is an interaction between *Capitation* and *PostReform*. This model employs different facility level time varying characteristics (total number

[6] The household survey was conducted in 2014 while the community and facility surveys if IFLS5 was conducted in 2015.

of FTE and PTE contracted staff). However, the community level time-varying characteristics included are the same as the above model.

As this is a panel dataset that spans over 20 years, one would expect many developmental characteristics of the facility and community to change over time, hence controlling for time varying developmental characteristics is vital. A previous study employing similar dataset to examine health policy reform in Indonesia also controlled for similar community characteristics (Johar 2010). The results are disaggregated into urban and rural CHCs as study has shown that there exists remarkable differences in the provision of healthcare between urban and rural regions in Indonesia (Priebe et al. 2014).

Table 2: Summary Statistics

Variables	Definitions	Urban[1] (N= 717)		Rural[1] (N= 228)	
		Mean	**SD**	**Mean**	**SD**
Key Variables					
Total FTE Contracted Staff	Total number of full time equivalent contracted health workers in the facility	4.618	7.851	5.197	9.466
Total PTE Contracted Staff	Total number of part time equivalent contracted health workers in the facility	0.898	3.123	1.202	3.639
Total FTE Permanent Health Workers	Total number of full time equivalent permanent health workers in the facility	21.413	11.434	17.583	11.026
Total PTE Permanent Health Workers	Total number of part time equivalent permanent health workers in the facility	2.891	7.735	3.904	9.850
Total Outreaching Health Workers	Total number of outreaching health workers in the facility	5.999	5.558	5.373	5.619
Total Family Planning Staff	Total number of family planning staff in the facility	6.283	5.417	6.465	6.645
Controls					
Total households	Total number of households in the community	2859.453	3156.352	1063.728	1583.235
Piped drinking water	Presence of piped drinking water in the community (1, Yes; 0, No)	0.773	0.419	0.404	0.492
% Electricity	% of households with electricity supply in the community	91.031	16.491	74.254	28.469
Asphalt	Presence of Asphalt road in the community (1, Yes; 0, No)	0.974	0.161	0.908	0.290
Region	1, Urban; 0, Rural	0.845	0.362	0.101	0.302

Note: [1] indicates the status of the region as at year 2015.

Empirical Strategy

A combination of propensity score matching (PSM) and difference-in-difference (DID) techniques was employed to model the impact of capitation payment reform on provider autonomy by using the number of contracted health workers employed in the CHCs as proxies on a balanced panel. Following Rosenbaum and Rubin (1983), the conditional probability of receiving treatment (capitation grant) for each observation was estimated by matching the propensity scores of non-capitated CHCs (control) to capitated CHCs (treatment) based on a set of observed covariates at the pre-intervention phase. A one-to-one nearest neighbour matching with replacement was executed using a logit model.[7]

$$P(D=1|Xi) = G(\beta Xi),$$

[7] Treatment and control was matched using data from wave one (year 1993) of IFLS.

where Xi includes all the facility level covariates (total permanent FTE health workers, total permanent PTE health workers, total contracted FTE health workers, total contracted PTE health workers, total outreaching health workers, total family planning staff) and community level covariate (urban/rural region) in linear terms that are likely to affect the treatment assignment and outcomes.

The use of PSM at the pre-intervention phase is meant to account for systematic difference in baseline characteristics and to balance the treatment and controls on a set of pre-treatment covariates and outcomes (Austin 2011; O'Neill et al. 2016). This matching is rested on conditional independence assumption of treatment and control observations[8] that fulfils the balancing hypothesis. A balancing test was performed to ascertain that observed characteristics from treatment and control groups are fairly similar and reasonably comparable at the pre-intervention phase (see appendix). Only observations that fall under the common support area were included in the final sample.

A DID model was then applied to the matched data, and facility fixed-effects and time fixed effects (based on survey waves) were included as measures to control for facility heterogeneities across time, with standard errors clustered at the facility level (Bertrand, Duflo, and Mullainathan 2004). The exact model is as follows:-

$$Ypct = \alpha 0 + \beta\,(Capitation pct * Post\ reform pct) + \gamma\, Xct + \delta\, Xpt + \mu i + \nu t + \varepsilon pct\ ,\ t=1993, 1997, 2000, 2007, 2015$$

with variable Y being the number of full time or part time contracted health workers in facility p in community c in time t; variable *Capitation*pct being a dummy for treatment (equals 1 for treatment); variable *Post reform*pct being policy reform dummy (equals 1 for year 2015); variable Xct representing a series of time varying community controls (total households, presence of piped drinking water, presence of households receiving electric supply, presence of asphalt road, urban/rural region); variable Xpt representing time varying facility controls (total FTE permanent health workers and total PTE permanent health workers); μi representing facility fixed effects; νt being time fixed effects and εpct as idiosyncratic error term. The coefficient of interest in our model is β.

The validity of the above empirical model was further tested by using a set of different dependent variables (the number of permanent health workers in the CHCs) that are not expected to change as a result of capitation payment reform. These proxies were employed as falsification tests to show that capitation payment reform only exerted supply-side effects on targeted or intended outcomes as envisioned by the policy makers.

Due to the non-random implementation of most policy interventions, it is important to consider selection bias regarding inherent differences between capitated CHCs and non-capitated CHCs that predisposed them to either receiving or not receiving capitation grants. This implies that capitated CHC and non-capitated CHC would have possessed different pre-intervention trends which resulted in capitated CHC having higher probabilities in receiving the treatment (Stuart et al. 2014; Wooldridge 2010). If this holds true, it would bias the findings in respect of the causal estimate of the intervention. The DID model assumes parallel pre-intervention trends between treatment and control groups (Wooldridge 2010). To test this assumption,

[8] The conditional independence assumption states that the probability of an observation receiving treatment is the same conditional on the distribution of a set of observed covariates which is independent of the treatment status.

several graphs depicting the coefficients and the confidence intervals of the interaction terms of time dummies and treatment groups (capitated versus non-capitated) were plotted from the main results that were statistically significant.

To test the robustness of our findings, a slightly different model specification was applied as a robustness check. Facility fixed effects were replaced with district fixed effects. As decentralisation directly devolves the autonomy for policy decision-making in developmental areas such as health to the local district government (Rosser and Wilson 2012; Aspinall 2014; Kristiansen and Santoso 2006), facilities within the same district are likely to adopt the same policies. The results are expected to remain consistent by controlling for heterogeneities at the district level (see appendix).

Findings

Impact of Capitation Payment on the Number of Contracted Health Workers

Table 5.3 reports the findings of the impacts of capitation payment on the number of FTE contracted health workers. Capitation payment reform resulted in the increase of total FTE contracted staff, FTE contracted nurses, FTE contracted midwives and FTE contracted paramedics for CHCs in the urban region. Specifically, the increase was significant for total FTE contracted staff and FTE contracted midwives, with capitated CHCs reporting 3.38 more FTE staff ($p<0.1$) and 2.05 more FTE midwives ($p<0.05$) than non-capitated CHCs at post reform. In the rural region, capitated CHCs witnessed an increase in total FTE staff, FTE nurses and FTE midwives, but the results were not significant.

Similar trends were observed for the impacts of capitation payment on PTE contracted health workers depicted in Table 5.4. Findings showed that capitated CHCs in the urban region experienced significant increases in total PTE contracted staff, PTE contracted nurses and PTE contracted midwives, reporting 1.69 more total PTE contracted staff ($p<0.05$), 0.45 more PTE contracted nurses ($p<0.05$), and 0.45 more PTE contracted midwives ($p<0.1$) respectively at post reform as compared to non-capitated CHCs. Nevertheless, capitated CHCs in the rural region do not appear to witness significant increase nor decrease in the number of PTE contracted health workers post reform.

Impact of Capitation Payment on the Number of Permanent Health Workers

To ascertain that capitation only endowed provider with the autonomy of increasing the head count of contracted health workers and not permanent health workers who are on the government payroll, I replaced the dependent variables of FTE and PTE contracted health workers with FTE and PTE permanent health workers by applying the same empirical strategy.

Table 5.5 reports the findings of the impacts of capitation payment on the number of FTE permanent health workers in similar facilities. With the exception of the number of FTE dentists which showed a significant increase at post reform (0.33, $p<0.1$), capitation payment reform did not have an impact on the number of permanent health workers in other allied health disciplines such as nursing and midwifery. There was however, a significant decrease in the number of FTE

paramedics among CHCs in the urban region (-0.84, $p<0.05$) after capitation payment was introduced.

Findings did not reflect that capitation payment had influenced the government's allocation decision for permanent health workers in CHCs that receive capitation grants. However, the increasing trends for FTE contracted nurses and midwives, and decreasing trends for FTE nurses and midwives in CHCs, especially in the rural region, suggests that there might be substitution effects for nursing and midwifery staff as a result of capitation payment grant that gives health facilities more leverage in determining the number of contracted health workers that they could recruit. Such effects were not statistically significant.

The substitution effects of capitation grant in increasing the number of contracted health workers to possibly replace permanent health workers were also observed in the number of PTE health workers, especially in the rural region, as shown in Table 5.6. Among capitated CHCs in the urban region, there were no significant increases in the number of permanent health workers across various disciplines. In the rural region, the number of permanent PTE health workers saw a decrease across different types of health workers, except for paramedics. These results were however not statistically significant.

Results from Table 6.6 and Table 5.6 largely indicated that capitation payment had had no significant effects on the hiring or allocation of FTE and PTE permanent health workers in capitated health facilities.

Table 3: Impact of Capitation Payment Reform on the Number of FTE Contracted Staff in CHC

Dependent Variables	Urban (as at 2015)				Rural (as at 2015)			
	Total FTE Contracted Staff	FTE Contracted Nurse	FTE Contracted Midwife	FTE Contracted Paramedic	Total FTE Contracted Staff	FTE Contracted Nurse	FTE Contracted Midwife	FTE Contracted Paramedic
*Capitation**	3.383*	0.791	2.048**	0.237	2.107	1.067	-0.025	-0.861
Post Reform	(2.040)	(0.777)	(0.971)	(0.387)	(3.986)	(2.345)	(1.915)	(1.112)
Constant	-9.037***	-4.379***	-3.475	0.063	-0.387	2.095	-1.944	-1.350*
	(3.096)	(1.379)	(1.565)	(0.617)	(3.911)	(1.779)	(1.681)	(0.702)
Observations	727	727	727	727	236	236	236	236
R-squared	0.552	0.495	0.606	0.296	0.695	0.609	0.720	0.458
Facility fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: [1] Clustered standard errors in parentheses (by facilities). *** p<0.01, ** p<0.05, * p<0.1 [2] All observations are at the facility-level, and all regressions controlled for facility-level time-varying heterogeneities (total FTE permanent staff and total PTE permanent staff) and community-level time-varying heterogeneities (total number of households, presence of piped drinking water, % of household with electricity supply, presence of asphalt road, and region).

Table 4: Impact of Capitation Payment Reform on the Number of PTE Contracted Staff in CHC

Dependent Variables	Urban (as at 2015)				Rural (as at 2015)			
	Total PTE Contracted Staff	PTE Contracted Nurse	PTE Contracted Midwife	PTE Contracted Paramedic	Total PTE Contracted Staff	PTE Contracted Nurse	PTE Contracted Midwife	PTE Contracted Paramedic
*Capitation**	1.688**	0.453**	0.448*	0.053	0.211	0.719	0.326	0.277
Post Reform	(0.802)	(0.198)	(0.238)	(0.063)	(1.913)	(0.626)	(0.264)	(0.278)
Constant	-1.002	0.451	0.092	-0.062	-1.916	0.813	0.152	-0.551
	(1.989)	(0.781)	(0.492)	(0.086)	(1.673)	(0.782)	(0.334)	(0.442)
Observations	726	726	726	726	236	236	236	236
R-squared	0.382	0.247	0.276	0.212	0.421	0.278	0.285	0.238
Facility fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: [1] Clustered standard errors in parentheses (by facilities). *** p<0.01, ** p<0.05, * p<0.1 [2] All observations are at the facility-level, and all regressions controlled for facility-level time-varying heterogeneities (total FTE permanent staff and total PTE permanent staff) and community-level time-varying heterogeneities (total number of households, presence of piped drinking water, % of household with electricity supply, presence of asphalt road, and region).

Table 5: Impact of Capitation Payment Reform on the Number of FTE Permanent Staff in CHC

Dependent Variables	Urban (as at 2015)						Rural (as at 2015)					
	Total FTE Staff	FTE GP	FTE Dentist	FTE Nurse	FTE Midwife	FTE Paramedic	Total FTE Staff	FTE GP	FTE Dentist	FTE Nurse	FTE Midwife	FTE Paramedic
*Capitation**	-0.866	0.364	0.331*	-1.536	0.545	-0.836**	-2.520	0.431	0.295	-0.711	-1.557	1.377
Post Reform	(2.987)	(0.263)	(0.171)	(1.011)	(1.042)	(0.376)	(3.855)	(0.296)	(0.201)	(1.749)	(1.879)	(0.921)
Constant	23.705***	2.069***	0.549***	5.518***	8.416***	3.282***	-1.363	-0.263	-0.087	2.438**	-3.967***	1.059
	(2.908)	(0.341)	(0.161)	(1.050)	(1.362)	(1.010)	(2.998)	(0.334)	(0.208)	(1.170)	(1.301)	(0.762)
Observations	714	714	714	714	714	714	227	227	227	227	227	227
R-squared	0.660	0.585	0.587	0.565	0.595	0.505	0.587	0.424	0.668	0.516	0.604	0.452
Facility fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: [1] Clustered standard errors in parentheses (by facilities). *** p<0.01, ** p<0.05, * p<0.1 [2] All observations are at the facility-level, and all regressions controlled for facility-level time-varying heterogeneities (total PTE permanent staff, total FTE contracted staff, total PTE contracted staff) and community-level time-varying heterogeneities (total number of households, presence of piped drinking water, % of household with electricity supply, presence of asphalt road, and region).

Table 6: Impact of Capitation Payment Reform on the Number of PTE Permanent Staff in CHC

Dependent Variables	Urban (as at 2015)						Rural (as at 2015)					
	Total PTE Staff	PTE GP	PTE Dentist	PTE Nurse	PTE Midwife	PTE Paramedic	Total PTE Staff	PTE GP	PTE Dentist	PTE Nurse	PTE Midwife	PTE Paramedic
*Capitation**	2.959	0.362	-0.251	1.321	1.209	0.150	-7.592	-0.881	-0.319	-2.045	-4.658	0.249
Post Reform	(2.117)	(0.281)	(0.169)	(1.068)	(0.967)	(0.104)	(5.497)	(0.846)	(0.266)	(2.104)	(3.728)	(0.262)
Constant	5.601**	0.118	0.357*	2.181**	1.602	0.202	-4.544*	-0.129	0.025	-1.003	-3.281**	-0.144
	(2.283)	(0.287)	(0.204)	(0.892)	(1.323)	(0.259)	(2.659)	(0.246)	(0.112)	(1.268)	(1.593)	(0.194)
Observations	714	714	714	714	714	714	227	228	228	228	228	228
R-squared	0.620	0.529	0.410	0.584	0.552	0.231	0.760	0.641	0.536	0.721	0.700	0.359
Facility fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

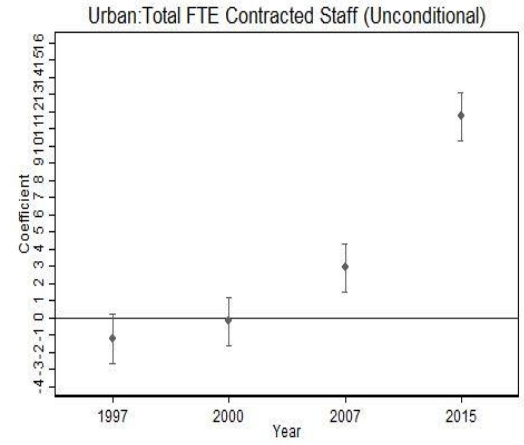
Note: [1] Clustered standard errors in parentheses (by facilities). *** p<0.01, ** p<0.05, * p<0.1 [2] All observations are at the facility-level, and all regressions controlled for facility-level time-varying heterogeneities (total FTE permanent staff, total FTE contracted staff, total PTE contracted staff) and community-level time-varying heterogeneities (total number of households, presence of piped drinking water, % of household with electricity supply, presence of asphalt road, and region).

Robustness Checks

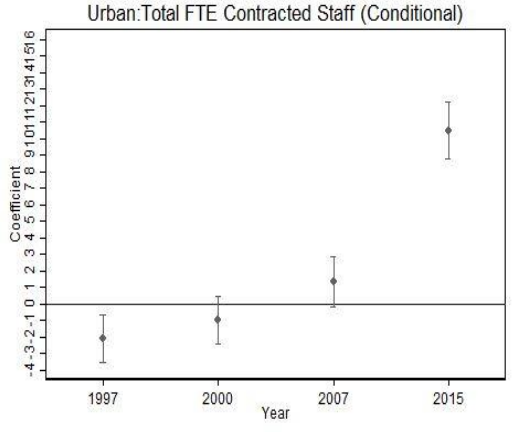
Our first robustness checks tested if there are parallel pre-intervention trends between capitated CHCs and non-capitated CHCs, only on the significant findings presented in Tables 5.2 and 5.3. To execute this, I regressed the outcome variables for each of the findings that were statistically significant, and plotted the coefficients of the interaction terms of time dummies and treatment groups (capitated versus non-capitated) for all the IFLS years, using the interaction of the year 1993 and treatment group as reference. I plotted both conditional and unconditional trends for the analysis. Conditional trends controlled for all the time-varying community level controls and facility level controls, while unconditional trends did not control for these time-varying variables. Figures one to five show that both the unconditional and conditional parallel pre-intervention trends were generally observed for five dependent variables modelled in the first set of analysis. While total FTE contracted staff, FTE contracted midwife, total PTE contracted staff and PTE contracted midwife in the urban regions exhibited strong pre-intervention parallel trends, it was less pronounced for PTE contracted nurse in the urban regions.

I also performed another set of robustness checks to the main findings by changing the model specification, replacing facility fixed-effects with district fixed-effects. Findings from this largely mirrored the findings presented in Table 5.2 and 5.3 in terms of the directions and significance of the coefficients (see appendix).

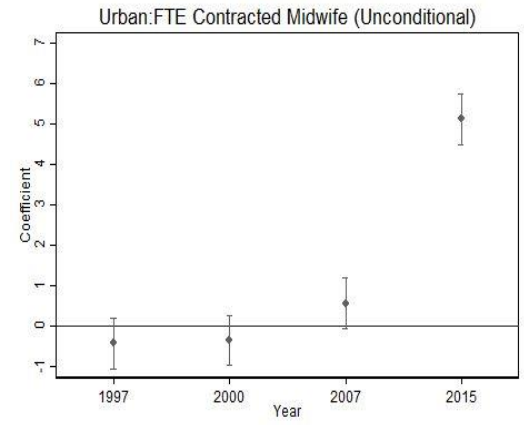
Figure 5.1 (1a-5b): Graphs depicting pre-intervention trends between capitated CHCs and non-capitated CHCs



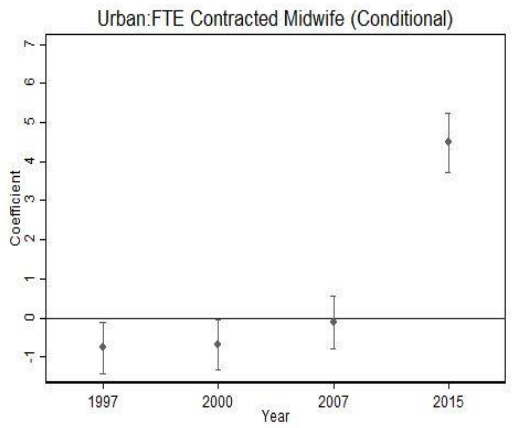
1a: Pre-Intervention Trends for Total FTE Contracted Staff in Urban Regions (Unconditional)



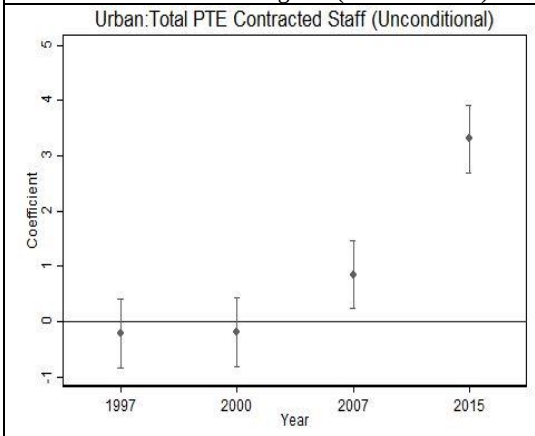
1b: : Pre-Intervention Trends for Total FTE Contracted Staff in Urban Regions (Conditional)



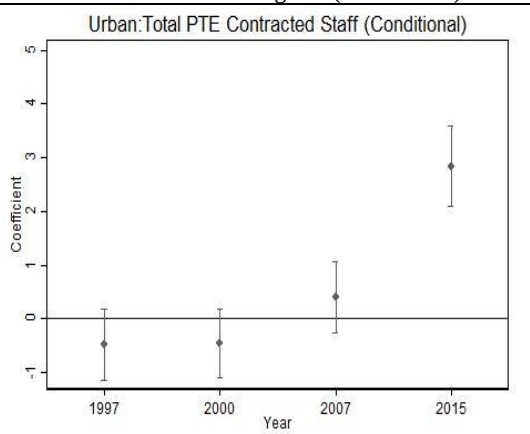
2a: Pre-Intervention Trends for FTE Contracted Midwife in Urban Regions (Unconditional)



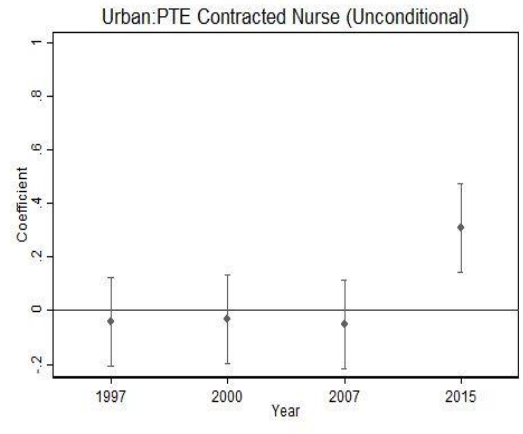
2b: Pre-Intervention Trends for FTE Contracted Midwife in Urban Regions (Conditional)



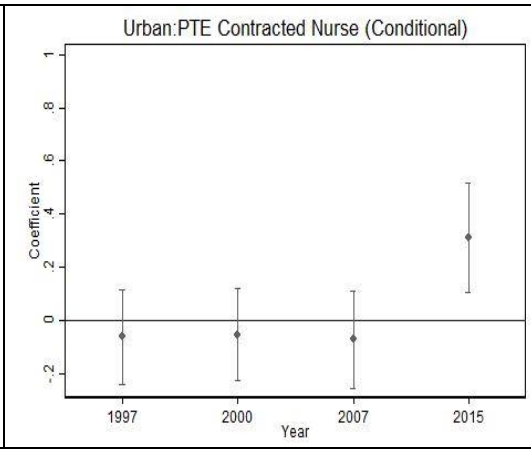
3a: Pre-Intervention Trends for Total PTE Contracted Staff in Urban Regions (Unconditional)



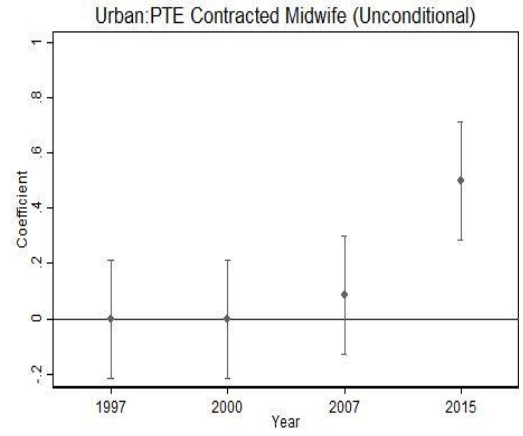
3b: Pre-Intervention Trends for Total PTE Contracted Staff in Urban Regions (Conditional)



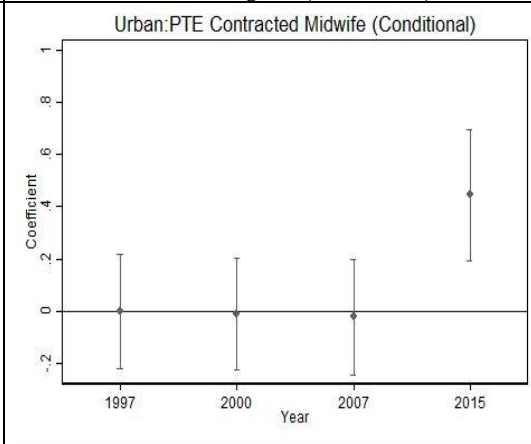
4a: Pre-Intervention Trends for PTE Contracted Nurse in Urban Regions (Unconditional)



4b: Pre-Intervention Trends for PTE Contracted Nurse in Urban Regions (Conditional)



5a: Pre-Intervention Trends for PTE Contracted Mifwife in Urban Regions (Unconditional)



5b: Pre-Intervention Trends for PTE Contracted Mifwife in Urban Regions (Conditional)

Discussion and Conclusion

Limitations of the Study

There are several limitations in this study. First, this study examined the impact of capitation grant to public primary health providers – the CHCs – without analysing the impact towards the private primary health providers that are also receiving capitation grants due to the lack of such data in the IFLS private health facility surveys. After the JKN reform, private health providers are increasingly accounting for a bigger share of primary health service provision in Indonesia. Hence, examining the impacts of capitation grants to their service delivery capacity would be crucial as new reform measures are introduced.[9] Second, this study was unable to model the impact of capitation grants to the cost efficiency outcomes of CHCs. Ideally, analysing the cost impacts of capitation grants to CHCs would be much desirable, considering that is a common outcome indicators that have always been explored in the health economics literature (Yip et al. 2001; Nguyen et al. 2017). Due to inconsistent and unavailability of cost data such as recurrent expenditure, operating expenditure and cost per patient across different IFLS waves, this study did not

[9] A total of 4,416 Private General Practitioners and 5,563 Private Clinics contracted with BPJS-Health as at October 2017. This constitutes about half of the total primary health providers that contracted with BPJS-Health (Information source: BPJS Health, 2017. Assessed 28th October 2017 on URL: https://bpjs-kesehatan.go.id/bpjs/)

attempt to analyse the cost impacts of capitation grants to CHCs. Should resources permit, a more encompassing research design would entail unearthing and assembling CHCs' administrative data, or gathering cost information from CHCs through provider surveys. Previous studies that combined administrative and survey data were able to yield more comprehensive results (Maharani and Tampubolon 2014; Maharani, Femina, and Tampubolon 2015).

Policy Implications

Capitation grants have an early impact in enhancing the autonomy of CHCs to hire more contracted health workers to meet the rising health demands with National Health Insurance expansion in Indonesia. This impact, nevertheless, was only observed among capitated CHCs located at the urban areas. This urban-rural inequity in terms of distribution of additional human resources in health indicates that rural residents may not be receiving adequate healthcare services as compared to the urban residents. It is not uncommon that health resources such as health workers and quality of health services are distributed unevenly in Indonesia as a previous study has found that rural areas in Indonesia tend to be consistently disadvantaged, in spite of the overall rise in the number of health workers and private sector growth nationally (Diana 2015). This unevenness should raise an alarm to the government and policy makers who are concerned about improving health equity within the nation, on top of fulfilling their self-interests to stabilise their political power. Health development in the rural areas plays an important role in sustaining political capital and cementing control amongst politicians when seeking re-election, given that 46% of the populations are still residing in the rural areas as at 2016 (The World Bank 2017). If nearly half of the population is still not receiving optimal care due to a shortage of human resources in health, it could breed resentment. Negative sentiments can build on and culminate in political repercussions that are detrimental to the electoral survival of the politicians. Previous studies have shown that progressive health reform agendas such as expansion of health coverage are instrumental in determining the electoral outcomes at the district level in Indonesia (Aspinall 2014; Kristiansen and Santoso 2006; Pisani, Olivier Kok, and Nugroho 2017; Jung 2016). As more populations are covered with health insurance, voters may well demand better access and higher quality of care, without these being compromised by a shortage of health workers.

That said, there are several explanations for the above phenomenon. Studies from developing countries in Asia and Africa have shown that rural residents tend to seek less healthcare as compared to urban residents (Aung et al. 2016; van der Hoeven, Kruger, and Greeff 2012; Thompson, Miller, and Witter 2003; Musoke et al. 2014). This may be due to financial constraints among most rural populations (van der Hoeven, Kruger, and Greeff 2012; Musoke et al. 2014; Aung et al. 2016), lack of access to a decent health facility (Musoke et al. 2014; Aung et al. 2016), poorly equipped health services (Musoke et al. 2014) and lower appraisal of the value of health care among rural populations (Thompson, Miller, and Witter 2003). In this study, what remains unestablished from the findings is whether maintenance of the status quo in the number of contracted health workers in rural capitated CHCs is a provider response towards less healthcare utilisation from rural residents, or a managerial policy to divert these resources to other developmental areas.

Future Research Direction

While it is beyond this study to examine the underlying reasons of why capitated CHCs in rural areas have not shown similar trends as their urban counterparts in boosting their contracted health worker supply, understanding the mechanisms of this phenomenon would be an important research endeavour to undertake in the future. In addition, it would also be important to understand the extent that these additional human resources in health in the CHCs are affecting the health seeking behaviours of the population, and whether increased health workforce translates into better performance and higher quality of care in the longer term.

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Appendix:

Balancing Test for Propensity Score Matching

Variable	Unmatched (U) Matched (M)	Mean		% reduct		t-test		V(T)/ V(C)
		Treated	Control	%bias	bias	t	p>t	
Total Permanent	U	19.49	15.822	42.5		2.62	0.010	0.75
Staff FTE	M	19.49	20.082	-6.9	83.9	-0.64	0.522	0.94
Total Permanent	U	0.35294	0.68889	-13.2		-1.04	0.297	0.10*
Staff PTE	M	0.35294	0.24183	4.4	66.9	1.10	0.270	3.67*
Total Contracted	U	1.1765	0.86667	21.4		1.21	0.228	1.39*
Staff FTE	M	1.1765	1.1673	0.6	97.0	0.05	0.960	0.96
Total Contracted	U	0.01307	0.04444	-13.9		-1.07	0.287	0.15*
Staff PTE	M	0.01307	0	5.8	58.3	1.42	0.157	.*
Total Family	U	4.3725	3.8	25.7		1.48	0.141	1.20
Planning Staff	M	4.3725	4.2693	4.6	82.0	0.41	0.683	1.25
Total Outreach	U	5.2418	4.4444	25.4		1.49	0.138	1.03
Staff	M	5.2418	5.2614	-0.6	97.5	-0.06	0.955	1.13
Region	U	0.61438	0.73333	-25.4		-1.46	0.145	.
(Urban/Rural)	M	0.61438	0.63922	-5.3	79.1	-0.45	0.655	.

*If variance ratio outside [0.73; 1.38] for U and [0.73; 1.38] for M

ROBUSTNESS CHECKS 1: Impact of Capitation Payment Reform on Number of FTE Health Workers (Replacing Facility Fixed-Effects with District Fixed-Effects)

Dependent Variables	Urban (as at 2015)				Rural (as at 2015)			
	Total FTE Contracted Staff	FTE Contracted Nurse	FTE Contracted Midwife	FTE Contracted Paramedic	Total FTE Contracted Staff	FTE Contracted Nurse	FTE Contracted Midwife	FTE Contracted Paramedic
Capitation Post Reform*	3.225*	0.774	1.733**	0.263	0.359	1.836	-2.056	-1.300
	(1.800)	(0.688)	(0.833)	(0.393)	(4.457)	(2.811)	(2.085)	(1.255)
Constant	-6.093***	-2.873***	-2.328***	-0.174	-1.721	0.353	-1.479	-0.925
	(1.578)	(0.626)	(0.709)	(0.372)	(2.694)	(0.934)	(1.323)	(0.687)
Observations	727	727	727	727	236	236	236	236
R-squared	0.543	0.440	0.558	0.165	0.691	0.555	0.682	0.484
District fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: [1] Clustered standard errors in parentheses (by facilities). *** p<0.01, ** p<0.05, * p<0.1 [2] All observations are at the facility-level, and all regressions controlled for facility-level time-varying heterogeneities (total FTE permanent staff and total PTE permanent staff) community-level time-varying heterogeneities (total number of households, presence of piped drinking water, % of household with electricity supply, presence of asphalt road, and region).

ROBUSTNESS CHECKS 2: Impact of Capitation Payment Reform on Number of PTE Health Workers (Replacing Facility Fixed-Effects with District Fixed-Effects)

Dependent Variables	Urban (as at 2015)				Rural (as at 2015)			
	Total PTE Contracted Staff	PTE Contracted Nurse	PTE Contracted Midwife	PTE Contracted Paramedic	Total PTE Contracted Staff	PTE Contracted Nurse	PTE Contracted Midwife	PTE Contracted Paramedic
Capitation Post Reform*	1.666**	0.480**	0.478*	0.063	-1.234	0.675	0.367	0.311
	(0.724)	(0.205)	(0.245)	(0.065)	(2.136)	(0.649)	(0.285)	(0.323)
Constant	-0.366	0.514	0.219	-0.032	-0.756	1.066*	0.092	-0.346
	(1.186)	(0.624)	(0.317)	(0.049)	(1.402)	(0.591)	(0.283)	(0.394)
Observations	726	726	726	726	236	236	236	236
R-squared	0.365	0.202	0.269	0.198	0.427	0.291	0.287	0.229
District fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: [1] Clustered standard errors in parentheses (by facilities). *** p<0.01, ** p<0.05, * p<0.1 [2] All observations are at the facility-level, and all regressions controlled for facility-level time-varying heterogeneities (total FTE permanent staff and total PTE permanent staff) community-level time-varying heterogeneities (total number of households, presence of piped drinking water, % of household with electricity supply, presence of asphalt road, and region).