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Recommended Citation

malik, a. m., Van de Poel, E., Van Doorslaer, E. (2017). Did contracting effect the use of primary health care units in Pakistan?. *Health Policy and Planning*, 1-10.

Available at: http://ecommons.aku.edu/pakistan_fhs_mc_chs_chs/302

Did contracting effect the use of primary health care units in Pakistan?

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Accepted on 15 March 2017

Abstract

For many years, Pakistan has had a wide network of Basic Health Units spread across the country, but their utilization by the population in rural and peri-urban areas has remained low. As of 2004, in an attempt to improve the utilization and performance of these public primary healthcare facilities, the government has gradually started contracting-in intergovernmental organizations to manage these BHUs. Using five nationally representative household surveys conducted between 2001 and 2012, and exploiting the gradual roll-out of this reform to apply a difference-in-difference approach, we evaluate its impact on BHU utilization. We find that contracting of the BHU management did not have any effect on health care use generally in the population, but it did significantly increase the use of BHU for childhood diarrhoea for the poor (by 4% points) and rural (3% points) households. These increases were accompanied by lower rates of self-treatment and private facilities usage. We do not find any significant effects on the self-reported satisfaction with BHU utilization. Our findings contrast with earlier small-scale studies that reported larger effects of the contracting of primary care in Pakistan. We speculate that the modest additional budget, the limited management authority of the contracting agency and the lack of clear performance indicators are reasons for the small impact of the contracting reform. Apparently critical aspects of services delivery such as location of BHUs, ineffective referral system and medical practice variation in public and private sectors have contributed to the overall low utilization of BHUs, yet these were beyond the scope of the contracting reform.

Keywords: Contracting-in, management contracting, impact evaluation, health econometrics, primary healthcare, difference-in-difference

Key Messages

- Despite the introduction of various policies, the public primary health care remains heavily underused in Pakistan and only accounts for less than five per cent of the aggregate demand for health care.
- We find little impact of the contracting reform on the use of Basic Health Units in Pakistan. This contradicts large effects of the reform reported in previous studies.
- We do find contracting to raise the use of BHU for childhood diarrhoea by poor and rural households, and to lower rates of self-treatment and private facilities use.
- The modest additional budget, the limited management authority of the contracting agency and the lack of clear performance indicators are likely reasons for the small impact of the contracting reform.

Introduction

In Pakistan, people are free to seek care from any type of health care facility and any level of care. Private care is the most popular choice: >60% of the aggregate demand for healthcare is provided by private healthcare providers (Akbari *et al.* 2009). Public primary health care caters to <5% of the aggregate demand of healthcare in Pakistan (Pakistan Bureau of Statistics 2005–2012). The first level of public primary care is offered by *Basic Health Units* (BHUs), which provide essential preventive and curative care services and serve as a referral point to the next level of healthcare. The target population of a BHU is around 10 000 people or a union council and/or within a radius of five kilometres. A BHU is staffed with a medical doctor and supported by a female trained birth attendant, vaccinators and paramedical staff. A *Rural Health Centre* (RHC) represents the next level of care, providing outpatient and some inpatient services (Javed and Amin 2007). In 2012, there were 5449 BHUs and 556 RHCs (Government of Pakistan 2012) serving a population of 184 million. In the past decades, the government has used various strategies to try to increase the utilization of care at BHUs and RHCs in order to reduce the pressure on secondary and tertiary care hospitals. These strategies included the construction of residences for doctors and female staff in the BHUs and RHCs Planning Commission, an enhanced non-salary budget for primary care facilities (Planning Commission 1993), the implementation of a health management information system to monitor progress (Afifi 1998) and a raise in doctor salaries (Javed and Amin 2007). In 2000, the government introduced the district government system in the entire country. In the health sector, the district health department was given autonomy in deciding over resource allocation, human resources, and financial management (Anjum and Ahmad 2001). In spite of all these reforms, the use of public sector primary healthcare facilities has remained extremely low (Pakistan Bureau of Statistics 2005–2012; Javed and Amin 2007; Malik *et al.* 2015).

As of 1999, the Rural Support Programs (RSPs),¹ which are not for profit joint stock companies (Batley and Mcloughlin 2004) mandated for rural development and poverty reduction through micro finance and other initiatives, were contracted by the provincial health departments for the management of BHUs in selected districts. The RSPs were given this contract without competition, reflecting the fact that they were partly funded by the provincial governments and therefore could be trusted to be given public funds. A pilot was started in Lodhran district, Punjab province, followed by a scaling up of the model to Rahim Yar Khan (RYK) District in 2003 (Punjab Rural Support Program 2008). A Memorandum of Understanding (MOU) was signed between the government of Punjab's health department and the Punjab Rural Support programme (PRSP) which gave the PRSP administrative and financial control over the management of all BHUs in RYK. The MOU provided the PRSP with the autonomy to implement organizational and management changes regarding the BHU infrastructure, staff, budget and procurement of medicines. PRSP introduced a number of changes in RYK such as (1) the recruitment of managers on a market-based salary, (2) formation of clusters of three BHUs with one doctor in-charge of the management, (3) enhancing salaries of medical officers, (4) developing community support groups and (5) enhancing the BHU infrastructure through additional funding from the Punjab government (Ali 2005; Loevinsohn *et al.* 2009). Quarterly monitoring of the performance of the PRSP by the health department was agreed upon, though no performance targets or sanctions/bonuses were included in the MoUs.

An initial assessment found the contracting reform to be associated with an increased use of BHUs of 54% (Loevinsohn *et al.* 2009), which led to a scaling up of the contracting reform to the national level. As of December 2013, 45% of BHUs across the country were managed by this model.^{2,3} While the evidence on the impact of this reform is positive, it only considers the first phase of the reform and claims of causality are severely limited due to lacking baseline data and problems of unrepresentativeness of the data (Loevinsohn *et al.* 2009; Martinez *et al.* 2010; Tanzil *et al.* 2014). We review this evidence in more detail in the next section. We contribute to the literature by evaluating the contracting reform using nationally representative data covering both the pilot and later phases of the reform. By comparing changes in health care use between districts that did and did not get contracted, we are able to estimate the effect of the reform, both for general ill-health conditions and for episodes of childhood diarrhoea. In contrast to earlier studies, we find the contracting reform to only marginally impact on the use of BHUs among the poor [4% age points (pp)] and rural households (3 pp). We hypothesize that the limited additional budget combined with limited management authority of the contracting agency and lack of clear performance indicators are reasons for the small impact.

Our findings have relevance beyond the Pakistan health policy context, as many other low and middle income countries are currently experimenting with contracting in the health care sector. While there is considerable enthusiasm for this approach, there is still relatively little robust evidence on its impact (Loevinsohn and Harding 2005; Palmer and Mills 2006; Liu *et al.* 2008).

Generalizing results across studies is difficult, because of the heterogeneity in the nature of contracts and contextual factors, such as the managerial and financial capacity of the principal of the contract. Mills (1998) and Siddique and Khan *et al.* (2006) have reviewed the success factors of contracting of clinical and non-clinical services in low and middle income countries. Some of the key aspects they identify are: (1) the influence of types and nature of contracts, (2) level of competition, (3) organizational capacity of public sector to manage contracts and (4) funding source of the contracting. Generally, the limited evidence from low- and middle-income countries to date suggests that performance-based contracts are more effective than those that are not performance based (Liu *et al.* 2008), and that contracting models that provide a greater degree of autonomy to the contracted agency are more effective than those in which the contracted agency needs to operate within public sector rules. There is limited evidence on the effects of contracting beyond pilot phases.

The three most relevant examples of countries that have employed similar types of NGO contracting strategies to raise the utilization of public primary care on a large scale are Cambodia, Guatemala and Afghanistan (Arur *et al.* 2010; Cristia *et al.* 2015; Van de Poel *et al.* 2015). Since 1999, for the management of district health services, a variety of contracting with non-governmental organisations (NGOs) has been implemented in Cambodia that link payment to performance targets. A recent evaluation by Van de Poel *et al.* (2015), using a similar difference-in-differences (DiD) design as used in this paper, found that while contracting did raise the rate of institutional deliveries (7.5%), effects are likely to be confined to the non-poor and can be limited when the contracted agency is constrained to operate within public sector employment and procurement rules (Van de Poel *et al.* 2015). Guatemala has used two models of capitation-based contracting for basic health services in

rural areas in 1995. Ministry of health, Guatemala contracted NGOs to manage existing health setup of the ministry. In the other model NGOs were the direct providers of the basic services. Using a DiD approach, a recent evaluation, covering the first phase of the reform, confirmed a modest increase in the services uptake in management contracts but no significant difference while comparing both the models. First dose of vaccination of children increased by 9–12% points and 10–11% points in management contracts and services delivery contracts respectively. Results also showed a significant increase in (1) the proportion (12% points) of pregnant women who had received three doses of Tetanus Toxoid and (2) proportion (4% points) of women who had used a modern contraceptive methods in management contracting model then in the controls (Cristia *et al.* 2015). Afghanistan has used two different approaches of contracting basic health services: contracting-out the management to NGOs, and contracting-in, with the government contracting with the districts and hiring technical support from NGOs. In 2006, 77% of the Afghanistan population was provided basic health care through contracting services. Also using a DiD technique, Arur *et al.* (2010) find contracting to substantially increase the use of outpatient care (29%) in Afghanistan, especially among the poor (41%), with little differences across the types of contracting (Arur *et al.* 2010). One of the main differences between these schemes and the reform in Pakistan is that in the latter no explicit goals or targets of the contracting reform were formulated, nor was the budget linked to any kind of performance measure. Both of these contract characteristics are highlighted by Loevinsohn *et al.* (2009) as important success factors.

The next section provides a more detailed description of the contracting reform in Pakistan, as well as an overview of the existing literature. Thereafter we describe the data and empirical strategy used to identify impact, after which we conclude and discuss the main results and policy implications.

Intergovernmental management contracting of primary care in Pakistan

Contracting of primary healthcare in Pakistan is an indigenous reform that started in the province of Punjab. Afterwards it was gradually rolled out to other provinces. Due to strong political will, the reform was implemented and scaled up to 75 out of 113 districts in the country.⁴ Theoretically the contracting reform should be seen as a form of relational contracting with cooperation between intergovernmental agencies rather than any legally enforceable obligations (Palmer 2000). It involved a transfer of funds as well as management to the inter-government agency RSP. The model is thus a hybrid of intergovernmental and management contracting according to the typology of Loevinsohn and Harding (2005).

The reform was widely criticized by the local medical community (Ali 2012; News 2012). In some cases, doctors even refused to be posted at the BHUs in reform districts (Ali 2005). One of the likely explanations is that medical doctors are not allowed to have a private medical practice while posted in BHUs managed by PPHI/RSP (Ali 2005). Health departments were also reluctant to hand over their authority to another agency (Ali 2005). None of the contracted districts have however been back-sourced to the health departments.

Figure 1 illustrates the gradual rollout of contracting by districts. It was implemented by provincial health departments at the district level. In the first phase a MOU was signed between the health departments and the RSPs to take over management of BHUs in a district. PPHI appointed a district manager who carried out renovation and operationalization of the BHUs under the new management

(Figure 1).⁵ Once contracted, district health offices transferred the annual budgets and the management of all BHUs to the contracting parties, the provincial RSPs. Provincial and district health departments are the principals and they sign an MOU with the respective provincial RSPs. Health department staff working at the BHUs were seconded to the RSPs. They retain their salary level and civil servant status, but the RSP is authorized to relocate staff from one BHU to another and pay additional benefits according to management needs. The RSP receive a grant-in-aid from the provincial governments to establish provincial and district support units (Khan 2010). At the service delivery level, the contracted BHUs received a one-time grant of PKR 100 000–150 000 (USD 1040–1560)⁶ for renovation and repairs. The authority to take disciplinary action against the staff seconded to RSPs is retained by the health department, but the RSP is allowed to appoint additional staff on a contractual basis (Punjab Rural Support Program 2008; Sarhad Rural Support Programme 2013). Public sector financial administration rules are replaced with the RSP's management system. For example, authority is granted to re-allocate funds from one line item to another, to transfer savings to the next year and to have an audit done by private audit companies (Sindh Rural Support Organization 2009). RSPs are required to report performance on key functions of the BHU on a quarterly basis to the health department, but no performance targets were set in the contractual agreement. It was, however, agreed to have a third party evaluation by the end of the first year on mutually agreed indicators. Contracts between the government and RSPs were signed for fixed terms with a possibility of extension (Punjab Rural Support Program 2008; Sindh Rural Support Organization 2009; Martinez *et al.* 2010). Health departments, on the one hand, served as the principal, signing MOUs with RSP and handing over BHUs to RSP, and on the other hand emerged as a competitor to RSPs by providing services through BHUs in districts that were not contracted to RSPs.

The evidence on the effects of contracting in Pakistan is limited. It generally reports positive findings but it is limited in scope and in its ability to make causal inferences. The RYK model was evaluated with a case control research design (Loevinsohn *et al.* 2009) that revealed the use of BHUs to be 13pp higher in RYK (35%) than in Bahawalpur (22%), a neighbouring control district with a comparable socio-economic situation. In 2010, a commissioned study evaluated the reform in three provinces other than Punjab. A logistic regression analysis comparing health care use in contracted and non-contracted districts revealed the use of BHUs to be significantly higher (odds ratio of 1.75) in contracted districts. Patient's satisfaction and observed quality of care were found to be 11 pp (36 vs 47%) and 15 pp (61 vs 76%) higher respectively in contracted districts (Martinez *et al.* 2010).⁷ Finally, a study on the outsourcing of BHUs in Sindh province compared volume and quality of services provided at two BHUs in Thatta (contracted) and Karachi (control) districts. The average daily number of outpatient visits was found to be 166% higher in the contracted district (80 visits) when compared with the control district (30 visits) (Tanzil *et al.* 2014).

In sum, the above studies suggest that there may have been positive effects of the contracting reform but they all relied on ex-post comparisons of districts with and without contracting in the absence of longitudinal data. It therefore remains difficult to causally attribute any of the observed differences to the introduction of contracting.

Methods

We use data from the *Pakistan Social and Living Standard Measurement Survey* (PSLMS) rounds of 2004–05, 2006–07,

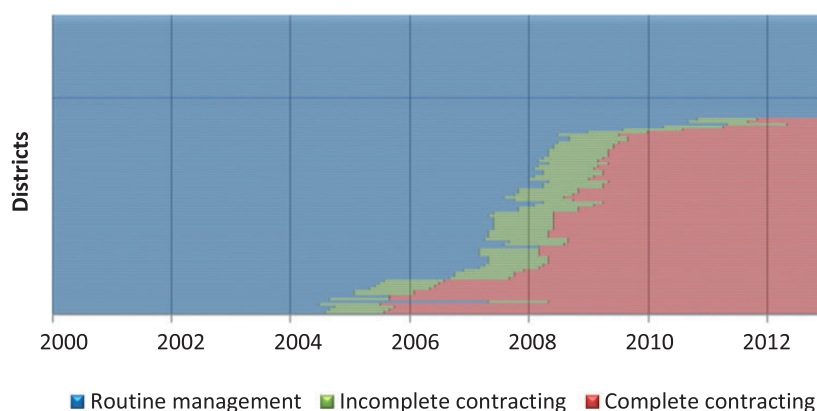


Figure 1. Overview of the rollout of contracting across districts in the period 2001–13. *Note:* Vertical axis represents each of 114 districts in four provinces of Pakistan. Horizontal axis indicates month and year of incomplete and complete contracting of the BHUs in districts or districts that remained with the provincial government health departments. Once contracted to PPHI, districts were never back-sourced to the provincial health department

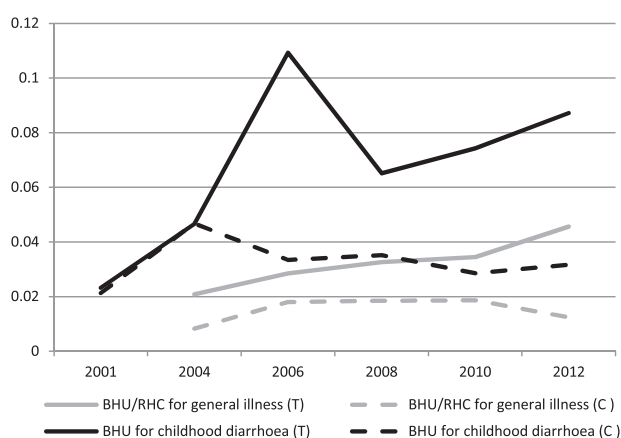


Figure 2. Trends in outcomes across treated and control Group (2001–12). *Notes:* Treated/Control refers to districts that got/did not get contracted by 2012. No information on BHU use for general illness was available in the 2001 survey

2008–09, 2009–10 and 2011–12 (Pakistan Bureau of Statistics 2005–2012), and from the *Pakistan Integrated Household Survey (PIHS) 2001–02* (Pakistan Bureau of Statistics 2003).⁸ The total sample size of the combined surveys is around 2.2 million respondents; the sample size for variables reflecting whether people sought care at BHU for unknown illness and childhood diarrhoea is 138 675 and 30 417, respectively. This gives us more power than previous studies to detect any effects of BHU contracting.

Our approach relies on a comparison of trends in health care use between districts that got contracted, referred to as the treated, compared with those that did not, referred to as the controls. We consider a district as treated if *all* BHUs in the district were fully operational under the new management at the time of the survey.⁹

BHUs typically provide preventive and primary care. A BHU is the focal point for most of the vertical primary health care programs funded by the federal government on health promotion, immunization and health education. We investigated the effects of contracting primary health care on the probability of seeking care at a BHU for unknown illnesses and more specifically for childhood diarrhoea in the 4 weeks preceding the survey. Seeking care for childhood diarrhoea is reported in all surveys mentioned above while seeking care at BHUs for unknown illnesses is only reported in the later Pakistan Living Standard measurement Surveys (Pakistan Bureau of Statistics

2005–2012). We distinguish between care sought at government hospitals and clinics, private hospital and clinics, BHU/RHCs,¹⁰ alternative and traditional healthcare providers, and pharmacies. We also estimate the effect of contracting on self-reported satisfaction with services availed from BHU in the wake of unknown illness, as this information was not available for childhood diarrhoea. Respondents who reported to have used services from a BHU were asked whether they were satisfied with the services provided and the reasons for dissatisfaction. Due to paucity of observations on the various reasons for not being satisfied, we simply grouped the variable into dissatisfied and satisfied with the services at BHU.

Descriptive evidence

Table 1 presents means of all outcome indicators for the 2001, 2004 (prior to the contracting-in) and 2012 surveys. Figure 2 presents trends in the use of BHUs for childhood diarrhoea and common illness across both the treated and control groups. It is clear that BHUs only account for a very small proportion of the general health care use and the use for childhood diarrhoea in both the control and treated group (going from 1.5% in 2004 to 5.25% and from 2.25% in 2001 to 5.25% in 2012, respectively). The trends suggest there to be a small effect of the contracting reform on the use of BHUs for cases of childhood diarrhoea, though only in the initial phases of contracting.

Private hospitals/clinics are the most important source of health care provision, accounting for over 60% of the use of general and child health care. The proportion of respondents reporting to forego care for childhood diarrhoea dropped from 18 to 8% between 2004 and 2001, which is probably related to the substantial increase in private hospital/clinic use, which went from 48 to 63%, but remained stable thereafter (65% by 2012). By 2012, the use of BHUs for childhood diarrhoea has increased among the treated group (by 5pp) while it has remained stable among the controls. BHU use for unknown illnesses also shows a small increase (of 2 pp) in the treated group while it remained fairly stable in the control group over 2004–12.

To assess the validity of our control group of districts, we compare baseline differences and pre-treatment trends (2001–04) in outcomes between both groups. Table 1 reports both means and differences in means between treated and control for the two pre-intervention years and the last survey year. Statistical significance of the difference in means is assessed by t-tests, and by normalized differences calculated as the difference in means divided by the square root of the sum of the variance.¹¹

Table 1. Means and difference in means of outcomes in 2001, 2004 (baseline) and 2012 and test of differences in means and trends

	2001			2004			2012			ϕ Change: 2004–12 Test: $\Delta T = \Delta C$ (P-value)
	Control (C)	Treated (T)	Normalized differences	Control (C)	Treated (T)	Normalized differences	Control (C)	Treated (T)	Normalized differences	
				Test: $\Delta T = \Delta C$ (P-value)						
Care seeking for childhood diarrhoea										
Did not seek care	0.195	0.154	-0.077	0.087	0.078	-0.022	0.061	0.067	0.018	0.488
Sought care at private hospital clinics	0.452	0.515	0.090	0.638	0.616	-0.031	0.676	0.632	-0.065	0.681
Sought care at other public hospital clinics	0.189	0.194	0.009	0.121	0.163	0.085	0.155	0.171	0.031	0.521
Sought care at BHU/RHC	0.021	0.025	0.022	0.060	0.032	-0.094	0.027	0.079	0.168	0.019
Sought care from other providers	0.060	0.027	-0.113	0.052	0.037	-0.049	0.037	0.015	-0.100	0.606
Self-prescription from pharmacy	0.083	0.085	0.004	0.043	0.073	0.091	0.046	0.036	-0.033	0.125
Care seeking for general illnesses										
Did not seek care	-	-	-	0.070	0.076	0.018	0.040	0.041	0.002	0.620
Sought care at private hospital clinics	-	-	-	0.665	0.605	-0.089	0.703	0.656	-0.071	0.706
Sought care at other public hospital clinics	-	-	-	0.160	0.212	0.093	0.164	0.195	0.058	0.558
Sought care at BHU/RHC	-	-	-	0.008	0.021	0.074	0.012	0.046	0.141	0.080
Sought care from other providers	-	-	-	0.061	0.034	-0.088	0.047	0.031	-0.057	0.531
Self-prescription from pharmacy	-	-	-	0.036	0.053	0.056	0.034	0.031	-0.012	0.204
Satisfied with the services provided at BHU	-	-	-	0.533	0.624	0.130	0.577	0.613	0.052	0.741
Observations	64 238	52 486	116 724	40 170	61 844	102 014	186 255	308 212	494 467	596 481

Notes: Treated/control refers to districts that got/did not get contracted by 2012. All variables are binary indicators. Seeking care at BHU is only defined for those individuals that report an illness. Sample sizes for seeking care at BHU for unknown illness are 7875 and 34 849 for the 2004 and 2012 surveys respectively. Sample sizes for seeking care at BHU in case of childhood diarrhoea are 2393, 2122 and 6364 for the 2001, 2004 and 2012 surveys, respectively. Normalized differences in mean are computed as the difference in mean divided by the square root of the sum of the variances. ϕ column gives the t -test of the null that the change in the mean between 2001 and 2004 (2004 and 2012) is the same across treated and control districts. This involved restricting the data to observations from the 2001 and 2004 (2004 and 2012) surveys and regressing each variable on a treatment indicator, a year indicator and an interaction between the two, and testing whether the coefficient on the latter is zero.

Differences in pre-intervention outcomes between control and treated groups are generally small; most notable is a higher reliance on private providers (when compared with public) for general health care in the control group. While some of the baseline differences are statistically significant (though none of the normalized differences are larger than 0.25), we found no evidence of differential trends in health care used for childhood diarrhoea in the 2001–04 periods. Also Figure 2 illustrates that trends in the use of BHUs were very similar across both groups prior to the contracting-in reform. The final column, which provides evidence of the difference in trends between both groups across the full period (the uncontrolled DiD estimate), suggests that there was indeed a significantly steeper increase in the use of care at BHUs in response to childhood diarrhoea and common illness in treated districts when compared with controls, though the differences are relatively small in size, which can also be seen in Figure 1.

Empirical analysis

We identify the impact of contracting-in with a DiD approach (Wooldridge *et al.* 2009) which relies on a comparison of the trend in the use of BHUs for contracted districts with the trend in non-contracted districts. Identification of a causal effect relies on the assumption that the trend in outcomes among the control districts provides a good counterfactual of what would have happened to the treated in the absence of contracting, i.e. the parallel trends assumption. Similarity in pre-intervention means and trends—as shown in Table 1 and discussed in the previous section—lends some credibility to this assumption. Given the non-random rollout of the contracting-reform it is, however, important to weaken the parallel trends assumption by controlling for observable characteristics that may have generated different trends across treated and control districts. We therefore control for characteristics including demographic and socio-economic aspects such as gender, age of the respondent (child in the case of childhood diarrhoea), educational attainment of the respondent (head of household in case of childhood diarrhoea), whether a family is headed by a female, urban/rural location and wealth quintiles derived from an asset index generated by principal component analysis.¹² Summary statistics of these variables can be found in the Supplementary Appendix table.

We estimate the following DiD model by ordinary least squares for each of the outcomes of interest (Puhani 2012)¹³:

$$y_{idt} = \beta * CC_{dt} + X_{idt} * \Omega + D_d + \tau_t + \varepsilon_{idt} \quad (1)$$

where y_{idt} is an indicator of whether the respondent (child) i used health care from a specific provider (no care, private, public, BHU, other, pharmacy). CC_{dt} reflects whether or not the district was (completely) contracted at time t . In our baseline analysis, we define (complete) contracting as the date at which the BHUs were fully operationalized by the contracting management. X_{idt} is a vector of household level characteristics and D_d and τ_t are district and year fixed effects respectively, which, respectively, pick up the time-invariant differences between contracted and non-contracted districts and the general time trend in the use of BHUs that is common to the contracted and non-contracted districts. Standard errors are adjusted for clustering at the district level. Our main interest lies in the parameter β which reflects the average treatment effect of contracting on the outcome of interest.

We also examine whether there were already any effects during the transition period in which the management of the BHUs moved from the health department to the PPHI by estimating two additional models. In the first, we assume contracting to have started

earlier, at the date when the RSP appointed the district managers to take over the management of BHUs from the health department. The model specification is identical as in equation (1) but the (full) contracting variable is replaced by the incomplete contracting variable IC_{dt} (as determined by the date of the district manager appointment). In a third model, we add both variables (CC_{dt} and IC_{dt}) [in equation (1)] to test for any differential effects of complete over incomplete contracting.

As BHUs mostly cater to poor households residing in rural areas, we also investigate the heterogeneity of the effect of (complete) contracting across urban/rural location and poverty status¹⁴ by adding interaction terms with the contracting variable and using the following specification:

$$y_{idt} = \partial C_{dt} + \gamma_1 CC_{dt} * \text{poor}_{idt} + \gamma_2 CC_{dt} * \text{rural}_{idt} + X_{idt} \Phi + D_d + \tau_t + \mu_{idt} \quad (2)$$

The average effect of contracting on a sub-group, e.g. the poor, is estimated by averaging the partial effect of contracting (CC_{dt}) across all observations in the sub-group that are exposed to contracting. To examine whether effects differ significantly between groups, we test the null hypothesis of no interaction between the treatment and group indicator, e.g. $\gamma_1 = 0$.

Results

Estimation results for three variants of model (1) on the effects of contracting on the type of care seeking are presented in Table 2—separately for childhood diarrhoea and for any unknown illness. While we generally find negative coefficients on foregoing care and on the use of private care and positive coefficients on seeking formal public care, most of the estimated coefficients are very small and not statistically significant. In the baseline model (1) for complete contracting (CC), we find only one significant effect of complete contracting: it lowers the probability of self-medicating from the pharmacy in response to childhood diarrhoea by 2.6 pp. There is no indication that the reform has achieved its main intended effect as the coefficient for BHU use is small and not significant. In models (1a) and (1b), we explore the effect of incomplete contracting (IC) but in neither of these we find a significant positive effect on the probability of seeking care from BHUs/RHC. Model (1a) only indicates a significant increase in seeking care from other providers (traditional medicine and spiritual healers) for unknown general illness, clearly not an intended effect of the contracting reform. We find the same when we estimate the effects of incomplete and complete contracting in model (1b): both have slightly reduced the likelihood of not seeking any care for general illness but they have only raised the likelihood to seek care from other providers, not from BHUs/RHC.

In Table 3, we show some tests of the heterogeneity of effects of (complete) contracting across urban/rural location and poverty status. Most of the effects are again insignificant in both groups, but now we do see that contracting has led to small but significant increases in the use of BHUs for childhood diarrhoea for the poor (4 pp, 160% compared with the baseline of 0.025) and for rural (3 pp) households. For unknown illness, we observe a small increase in the probability of seeking care at BHUs for the rural population only (1.5 pp). Similar to the results from the pooled sample, we find negative but insignificant effects on self-reported satisfaction with BHU services in both subsamples.

In general, the estimated effects on BHU services use are quite small in magnitude, and seem to be driven by a decline in both

Table 2. Effects of contracting on seeking care for unknown general illness and childhood diarrhoea

	Model 1	Model 1a	Model 1b	
	Complete contracting (CC)	Incomplete contracting (IC)	Complete contracting (CC)	Incomplete contracting (IC)
Seeking care for unknown general illness				
Did <i>not</i> seek care	-0.007 (0.006)	-0.014** (0.007)	-0.014* (0.007)	-0.017* (0.009)
At private hospitals/clinics	-0.011 (0.016)	-0.033 (0.026)	-0.029 (0.023)	-0.044 (0.043)
At public hospitals/clinics	0.010 (0.017)	0.020 (0.027)	0.019 (0.024)	0.022 (0.042)
At BHU/RHC	0.010 (0.007)	0.012 (0.008)	0.013 (0.009)	0.008 (0.009)
From other providers	0.011 (0.009)	0.028** (0.009)	0.026** (0.01)	0.036*** (0.007)
At pharmacy	-0.013 (0.01)	-0.012 (0.009)	-0.015 (0.009)	-0.005 (0.018)
Satisfaction with BHU	-0.084 (0.084)	-0.043 (0.081)	-0.069 (0.092)	0.040 (0.087)
Seeking care for childhood diarrhoea				
Did not seek care	0.006 (0.012)	0.001 (0.0121)	0.004 (0.013)	-0.008 (0.0168)
At private hospitals/clinics	-0.023 (0.026)	-0.050 (0.032)	-0.044 (0.0301)	-0.071 (0.0544)
At public hospitals/clinics	0.019 (0.019)	0.031 (0.0247)	0.029 (0.0228)	0.035 (0.0418)
At BHU/RHC	0.022 (0.014)	0.019 (0.0129)	0.024 (0.0148)	0.005 (0.0139)
From other providers	0.002 (0.009)	0.010 (0.0088)	0.007 (0.0093)	0.017 (0.0129)
At pharmacy	-0.027* (0.015)	-0.009 (0.0173)	-0.020 (0.016)	0.022 (0.0328)

This table shows coefficients from linear models including covariates as shown in Supplementary Appendix Tables S2 and S3. Standard errors (in parenthesis) adjusted for clustering on the district level. ***, **, * indicate significance at the 1, 5, 10% levels of significance, respectively. Model 1 includes variable on complete contracting only, Model 1a includes incomplete contracting (IC) and Model 1b includes both contracting variables (CC and IC).

self-medication and in care seeking from private hospitals. Any health impact of the reform is therefore likely to be small and also dependent on the quality of services provided at BHUs. To gauge any effects of the reform on quality of care provided at BHUs, we also used equations (1) and (2) to estimate effects on the probability that the child was given ORS for his/her episode of diarrhoea when s/he was taken to a specific provider. Because we did not find any significant effects, neither in the pooled sample nor in the rural and poor sub-groups, we can therefore not conclude that there has been a quality effect.

Discussion

Contracting NGOs for the management of primary health care delivery has been suggested to be an effective way of increasing the use and quality of health care in low income countries (Loevinsohn and Harding 2005; Palmer and Mills 2006; Liu *et al.* 2008). Over the past decade, all four provincial health departments in Pakistan have contracted RSPs to take over the BHU management with the aim of increasing their performance. By 2010, 45% of the BHUs had been contracted. Previous evidence on contracting in Pakistan (Loevinsohn *et al.* 2009; Martinez *et al.* 2010; Tanzil *et al.* 2014) reported contracted districts to have higher rates of utilization, but all of these studies were based on district specific pilots, were relatively small in scale and could not claim to have estimated a causal effect.

Using a DiD approach we measure the impact of the nationwide contracting reform over the period 2001–12. While we do not find any effect on BHU utilization in general for the full population, we do find (complete) contracting to have some effects on certain sub-groups. It increased the probability of seeking care at BHUs for childhood diarrhoea by 4 pp for the poor and by 3 pp for rural households. This is not a surprise as the use of BHUs is still relatively low and mostly confined to poor and rural areas. While the estimated effects are small in absolute magnitude, they do represent substantial relative increases compared with the very low baseline rates of BHU utilization (0.025 for childhood diarrhoea and 0.021 for unknown general illness). We do not find any significant effect on self-reported quality of care, or on the likelihood of receiving ORS for childhood diarrhoea.

Our results therefore do not confirm the promises suggested by earlier, descriptive studies. One possible reason for the discrepancy could be the selection of particular treated and control districts in previous (often pilot) studies. However, even when restricting our sample to the districts and time periods studied in earlier papers, we could not replicate the much higher rates of BHU use reported in previous studies (results are available in Supplementary Appendix S4, Supplementary data are available at *HEAPOL* online). The differences in results are therefore likely to be driven by the unrepresentativeness of the sample used in previous studies. For example, Loevinsohn *et al.* (2009) could only sample two villages from every district, with one being the closest to the BHU, leading to much higher BHU utilization rates (34 and 22% of those reporting to seek care in RYK and BH, respectively) when compared with the rates in our nationally representative data (Supplementary Appendix S4, Supplementary data are available at *HEAPOL* online). In the case of Martinez *et al.* (2010) the selection of districts and BHUs was non-random. Only the district with a middle socio-economic ranking and with BHUs that did not have another public facility at a distance of <3 km were included in the sample (Martinez *et al.* 2010). Tanzil *et al.* (2014) compared Thatta (treated) with Karachi (control), the former a rural and underdeveloped district and the latter a metropolitan city with a population of over 18 million (Tanzil *et al.* 2014).

There may be several potential reasons for our findings. One likely explanation for the limited impact that we observe is the *weak incentives* for BHUs and RSPs that were included in the design of the contracting reform. We could not find evidence of any additional resources provided to treated districts apart from the one-time grant for renovation of BHUs and some financial support to establish management units at provincial and district levels (Bano 2008; Loevinsohn *et al.* 2009; Sindh Rural Support Organization 2009; Martinez *et al.* 2010; Tanzil *et al.* 2014). There were also no clear performance targets set with the health departments. Furthermore, RSPs could not take any action against the staff working on regular salaries other than returning them to the health department if their performance was not satisfactory. Van de Poel *et al.* (2015) argued that such halfway houses have also existed in Cambodia in the early phase of contracting, and are best avoided (Van de Poel *et al.* 2015).

Table 3. Heterogeneous effects of complete contracting by poverty status and urban/rural location

	Non-poor partial effect	Poor partial effect	Urban partial effect	Rural partial effect
Care seeking for childhood diarrhoea				
Did not seek care	0.004 (0.012)	0.013 (0.018)	0.006 (0.012)	0.006 (0.013)
At private hospitals	-0.013 (0.025)	-0.048 (0.033)	-0.020 (0.031)	-0.023 (0.026)
At public hospitals	0.017 (0.019)	0.026 (0.022)	0.019 (0.02)	0.019 (0.02)
At BHU/RHC	0.015 (0.013)	0.043** (0.020)	0.003 (0.013)	0.029** (0.015)
From other providers	0.003 (0.009)	-0.003 (0.01)	0.005 (0.01)	0.001 (0.009)
At pharmacy	-0.025 (0.016)	-0.031 (0.017)	-0.013 (0.02)	-0.032 (0.015)
Care seeking for general illness				
Did not seek care	-0.005 (0.006)	-0.011 (0.008)	-0.001 (0.006)	-0.009 (0.007)
Private hospitals	-0.011 (0.017)	-0.006 (0.021)	0.001 (0.0191)	-0.016 (0.017)
Public hospitals	0.004 (0.018)	0.024 (0.018)	0.004 (0.02)	0.011 (0.018)
BHU/RHC	0.009 (0.007)	0.007 (0.008)	-0.005 (0.005)	0.015** (0.008)
Other providers	0.015 (0.009)	0.000 (0.012)	0.013 (0.011)	0.011 (0.009)
Pharmacy	-0.012 (0.01)	-0.014 (0.012)	-0.012 (0.012)	-0.013 (0.01)
Satisfaction with BHU for general illness	-0.060 (0.084)	-0.128 (0.094)	-0.100 (0.125)	-0.079 (0.087)

Notes: Estimates obtained from OLS models and by averaging the partial effect (standard errors in parenthesis) of contracting over observations within the respective subgroup. Homogeneity test is a *t*-test of the null that the partial effects of the two subgroups are equal. Other notes are as with Table 2.

Secondly, while contracting may have improved the management of BHUs, it did not address many of the *structural weaknesses* of the primary healthcare system in Pakistan. For instance, contracting organizations were not authorized to relocate BHUs that were not easily accessible to the target population. Bhatti (2005) reported that 67% of the BHUs in their study on geographical access of primary healthcare facilities in the Punjab province were more than 5 km away (on foot) from the target population (Bhatti 2005). Thirdly, in Pakistan there is hardly any functional referral system for public sector health facilities. People directly visit tertiary care hospitals even for common illnesses that can easily be managed at primary care facilities if appropriate staff and medicines are available (Siddiqi et al. 2001). While contracting did improve the availability of medicines and doctors at BHUs, apparently this has not sufficiently improve *quality perceptions* to deter patients to directly seek care at secondary and tertiary care facilities. Finally, the differences in medical practice at private and public facilities are not influenced by the contracting. Due to lack of regulation, the private clinics are not inclined to follow *clinical practice guidelines* (Shah et al. 2003; Berendes et al. 2011). Poly-pharmacy, irrational use of medicines, and overuse of injections and infusions are common commercial tactics used by private clinics to attract more patients (Siddiqi et al. 2002; Basu et al. 2012; Raza et al. 2014).

Very recently, PPHI has been transformed into public limited companies, independent of the rural support programs, in two provinces (Sindh and Baluchistan). The new status provides greater autonomy to expand services like, for example, the provision of preventive care, nutrition services, obstetrics-related in-patient care such as facility deliveries as well as other maternal and child health services. On the management side, PPHI Baluchistan is introducing performance based management and bidding for additional resources to upgrade BHUs to provide 24/7 maternal and child health services (PPHI 2014).

There are two important limitations to our study. First, our data cannot distinguish between the use of health care at BHUs and at RHCs, while the contracting reform was only targeted at BHUs. To the extent that the contracting reform attracts more people seeking care at the BHU first (rather than the RHC), our effect estimates could therefore be biased downward. However, the combined use of BHUs and RHCs appears too low (<5%) for this switching behaviour to be a likely explanation for the small impact. Second, as the

rollout of contracting did not occur in a randomized way, it is possible that there are some unobservable time-varying factors remaining, such as different district policies and circumstances, that correlate both with the contracting and health care use. The similarity in pre-contracting trends and means does suggest, however, that the parallel trends assumption is quite plausible.

Conclusion

Notwithstanding these limitations, our results imply that the contracting reform did not have a large impact on the use of public primary care. It seems imperative to critically review this reform. Contracting has definitely contributed to the renovation of BHUs and to ensuring all-year-round availability of doctor and medicines, but this has not had a large impact on households deciding to make use of BHUs when seeking care, except for some of the poor and rural households. These findings call for additional research on other determinants that may have affected this finding, including the access and location of BHUs, the variation in medical practice in public and private clinics and the effectiveness of the referral system.

Among the factors that seem essential to improve the effectiveness of contracting are: (1) a competitive and transparent bidding process, (2) explicit performance targets, (3) a well-designed package of service, (4) performance based incentives and (5) financial and management autonomy to contracted NGOs. The new stage of the reform implemented in two provinces would seem to provide greater flexibility to refine the contractual relationship between the government and the PPHI.

Supplementary data

Supplementary data are available at *Health Policy and Planning* online.

Acknowledgements

The authors thank Rabia Awan, Director of the Pakistan Bureau of Statistics for providing access to the Pakistan *Social and Living Standard Measurement Survey* (PSLMS) and the *Household Integrated Economics Survey* (HIES) data sets as well as valuable insight into sampling methodology and coding scheme of these surveys. Acknowledgements are also due to the CMPHI and PPHI administration, especially Rashid Bajwa, the then CEO of National

Rural Support Program. We highly appreciate their assistance in providing information on the roll out of the contracting reform all over the country.

Conflict of interest statement. None declared.

Funding

Ellen Van De Poel was supported by the Netherlands Organization for Scientific Research (Veni project 451-11-031). Muhammad Ashar Malik is funded by the Aga Khan University Faculty Development Award-2015.

Notes

1. The National Rural Support Program (NRSP) works at the national level while each province has provincial rural support program, e.g. Punjab Rural Support Program (PRSP), Sindh Rural Support Organization (SRSO), Sarhad Rural Support Program (SRSP) and Baluchistan Rural Support Program (BRSP) in Punjab, Sindh, Khyber Pakhtunkhwa and Baluchistan provinces. These programs receive funding from the government and classified as quasi non-government organization (Batley and Mcloughlin, 2004).
2. As of June 2012, there were 113 districts in four provinces, 36 in Punjab, 23 in Sindh, 24 in Khyber Pukhtunkhwa and 30 in Baluchistan (source: Pakistan Social and Living Standard Measurement Survey 2011–12, Pakistan Bureau of Statistics).
3. In some districts RHCs and Maternal and Child health facilities were also handed over to PPHI/CMPHI. As of December 2012, there were 658 other health facilities managed by PPHI/CMPHI besides BHUs.
4. As of December 2013, 2441 BHUs and 658 other primary healthcare facilities were contracted-in in 75 districts in four provinces and federal areas. In the three provinces namely Khyber Pukhtunkhwa (KPK), Sindh and Baluchistan this reform is now known as Peoples Healthcare Initiatives (PPHI). In Punjab it is named Chief ministers' Initiative for Primary Healthcare (CMIPHC). It has established a separate management structure at federal, province, division and district levels. After the enactment of 18th constitutional amendment, the federal unit of PPHI is dissolved.
5. The contracting process involved appointment of a district manager, taking over BHUs, carrying out repair and renovation and opening-up BHUs under new management. This process was completed in around 1 year (median 1.09 years and interquartile range 0.26 years).
6. In 2015 USD to PKR official exchange rate.
7. This study reports much higher utilization rates of BHU as compared to national statistics, likely related to the fact that data was collected from BHUs in areas where no other health care provider was available.
8. Sampling methodology of PSLM rounds 2006–12 allows for representativeness of findings to districts, provinces and national levels. PSLM 2004–05 and PIHS 2001–02 surveys are representative for population of provinces and national levels.
9. The process of contracting included a formal agreement between the district health department and the rural support programs, the establishment of a district management office,

and the taking over of the BHU to become operational. This process typically took about two years in each district. We used the date of becoming fully operationalization of BHUs as the starting point of the contracting period. Including an additional indicator reflecting incomplete contracting does not yield significantly different result.

10. In the PSLM survey BHUs and Rural Health Centers (RHC) are grouped together.
11. Normalized differences are a scale free measure that does not mechanically inflate with sample size. Wooldridge et al. (2009) find that normalized differences below 0.25 imply little sensitivity of linear regression method due to specification changes (Wooldridge et al. 2009).
12. The wealth index is estimated within each survey wave and uses information on the ownership of household durable goods e.g. electronic goods, furniture, transport and housing conditions.
13. We prefer OLS because the identifying assumptions of DiD with non-linear estimates differ from the parallel trends assumption in a linear setting (Puhani 2012). Results from non-linear models resulted in very similar impact estimates compared to those reported in the paper and are available from the authors upon request.
14. Poverty is defined as belonging to the poorest 20% of the population based on a survey-specific wealth index.

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