Impact of a Health Governance Intervention on Provincial Health System Performance in Afghanistan: A Quasi-Experimental Study

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Abstract—Poor governance contributes to poor health outcomes and may constrain a country’s progress in attaining its health goals. Yet, governance is not commonly used as a lever to improve the health sector or health system performance. Lack of a clear body of evidence linking governance interventions to better health system performance is one likely reason. This quasi-experimental study conducted in Afghanistan examines the causal impact of a provincial health governance intervention on the provincial health system’s performance. It compares health system performance indicators between 16 intervention provinces and 18 nonintervention provinces using a difference-in-differences analysis to draw inference. The intervention consisted of governance action planning, implementation of the governance action plan, and self-assessment of governance performance before and after the intervention.

The intervention had a statistically and practically significant impact on six indicators. Specifically, the intervention increased a province’s rate of outpatient department visits per person by an average of 18 percentage points and achievements in Penta 3 immunization, antenatal visits, postnatal visits, tuberculosis case detection, and facility delivery by 17, 14, 12, 11, and five percentage points, respectively (P < 0.01). No impact was detected on tetanus toxoid administration to pregnant mothers and tuberculosis cure; a marginally negative impact was seen in community health worker home visits and new family planning users.

Governing bodies provide an opportunity for governance reform. Improving health system governance is relevant to the current situation in low-income countries, where weak health systems are a significant barrier to addressing epidemics and providing high-quality health services.

INTRODUCTION

Background

Governance has infrequently been used as a lever to improve health sector and health system performance, arguably because of its perceived sensitivity and complexity. Sustainable
Development Goal (SDG) 16 emphasizes improving governance. Poor governance has contributed to poor health outcomes and may constrain progress in reaching the SDG 3 health targets. Good governance could be instrumental in achieving these ambitious health targets.

One of the reasons that donors have lacked interest in investing in governance interventions as a way to improve health system performance is that no clear body of evidence exists on the causal relationship between the two, especially in low- and middle-income country settings. Governments are at a loss about where to start. Evidence is sparse and oftentimes anecdotal or is limited to before-and-after studies, usually with no control or comparison group. Our review of studies included in a recent systematic review showed that most stop at demonstrating association and do not examine causation. Donors are eager for the evidence demonstrating the link of better governance to improvements in health system performance; governments continue to remain largely indifferent because of the politically sensitive nature of governance reforms or because they do not know where to begin such reforms.

This quasi-experimental study examines the causal relationship between a provincial health governance intervention and provincial health system performance by comparing performance in intervention and nonintervention provinces using a difference-in-differences methodology to draw inference. The study contributes critical empirical evidence to a technical area in need of such. Our findings indicate the potential of governance to improve health system performance; we conclude that policy makers whose goal is to improve health system performance or health service delivery should consider implementing interventions to improve governance of the health systems.

**Institutional Context**

In Afghanistan, *shuras*, or informal consultative assemblies of elders, have a long and well-established tradition of resolving disputes and solving contentious issues in communities. By contrast, the Provincial Public Health Coordination Committee (PPHCC) is a formal multistakeholder committee that was established in the early 2000s by the Ministry of Public Health (MOPH) to carry out a set of distinct responsibilities at the provincial level. PPHCCs have been functional since that time in all 34 of Afghanistan’s provinces. Their level of functionality varies from province to province, with the majority tending to be weak and ineffective. They provide a forum for coordination and information sharing among various stakeholders in the provincial health system. They discuss community health concerns and coordinate and participate in all stages of emergency response. They also oversee health posts and health facilities by conducting joint monitoring and supervision visits during which a subset of committee members joins the provincial health team. They are expected to meet on a monthly basis and coordinate delivery of the basic package of health services as well as the essential package of hospital services. In essence, the PPHCC governs the provincial health system. That said, it should be noted that their governance role is rather limited—they are more of an advisory, consultative, and coordinating body. They have an oversight authority but no authority to hire and fire. Setting strategy, making rules and regulations, establishing policy and procedures, and allocating resources are all tasks predominantly performed by the Ministry and the government at the national level.

PPHCC is a multisectoral governing body chaired by the provincial public health director. It has 21 members including nine appointed provincial public health officers, the provincial hospital director, the director of the institute of health sciences, two representatives of nongovernmental organizations that provide health services at the health post and health facility levels, two district health officers, and one representative from each of the following: the Ministry of Women’s Affairs, the provincial reconstruction team, the private health sector, the elected provincial council, UNICEF, and the World Health Organization. Thirteen members have voting powers. Decisions made in the PPHCC are usually consensus based. When consensus is not reached, a decision is put to a vote. A decision requires a quorum and a majority of members voting in favor. The members are not paid a salary and do not receive sitting fees for serving on the committee. The governance development intervention in this study was primarily implemented by the PPHCCs in their provinces.

**Governance**

Governance is steering an organization in a shared strategic direction, whereas management is planning and using resources efficiently to produce intended results. Effective management is a critical support for good governance. Good governance, in turn, provides purpose, resources, and accountability in support of management. Both need to work in a partnership to achieve a desired result.

Governance has been extensively studied in the academic disciplines of public administration, public policy, political science, international relations, management, economics, sociology, and environmental sciences—not so much in the context of health services.

We see governance as setting a shared strategic direction; making policies, laws, rules, regulations, and decisions; raising and deploying resources to accomplish strategic goals and objectives; and overseeing and making sure that the strategic goals and objectives are accomplished. We define governance in terms of
its key practices—cultivating accountability, engaging stakeholders, setting a shared strategic direction, and stewarding resources.

Governance enables effective management of people, money, medicines, and information. Sound management, in turn, facilitates the work of doctors, nurses, and other health workers, enabling them to provide safe, timely, effective, and efficient care and services that are respectful of and responsive to individual patient and health service user preferences, needs, and values.

**METHODS**

This study examines the causal impact of a provincial health governance intervention on provincial health system performance in Afghanistan. The study design is quasi-experimental and uses Health Management Information System (HMIS) data to isolate impact by comparing performance in provinces with the governance intervention to those without, using a difference-in-differences analysis strategy. We hypothesized that the governance intervention improves health system performance.

We use difference-in-differences analysis to draw inference. In this methodology, outcomes are observed for two groups for two time periods: pre- and postintervention. One group is exposed to the intervention and the other is not. The difference between post- and pre-intervention in the control group is subtracted from the difference in the intervention group. This methodology removes biases in the post period comparisons between the intervention and control groups that could result from permanent differences between the groups, as well as biases from comparisons over time in the intervention group that could be the result of a time trend.  

### Intervention

In each intervention province, the governance intervention was conducted in three phases over a period of six months. In the first phase, using the provincial health system governance guide and the framework of effective governing practices (cultivating accountability, engaging stakeholders, setting a shared strategic direction, and stewarding resources), the PPHCCs identified actions to be taken to improve the governance of their provincial health system and designed a governance action plan for this purpose. They also measured the committee’s governance performance at baseline using self-assessment instruments. In the second phase, the committees implemented and monitored their action plans over a period of six months. In the third and final phase, the committees evaluated the implementation of their action plan and measured governance performance postintervention using the same self-assessment instruments. At this stage, they also examined each of the action items in the action plan to assess progress and to assess whether they planned on continuing their implementation beyond the initial six-month period. See Appendix 1 in Supplemental File 1 for the three phases of the intervention. Table 1 illustrates actions planned by the PPHCCs to improve their governance. Throughout the intervention period, a donor-funded provincial public health advisor, who was already embedded in the provincial public health office to provide technical assistance in public health management, supported the PPHCC in the implementation of their governance development plan and its monthly monitoring. We have described this intervention and its pilot testing in detail in an earlier journal publication.  

| Governing Practice | Examples of Activities |
|--------------------|------------------------|
| Improve stakeholder engagement | Interview patients and health service users Invite religious, youth, and women leaders to meetings Provide feedback to consultative assemblies at health facility level Consult community leaders on a regular basis |
| Cultivate accountability | Share information on resources and performance with communities and stakeholders Encourage health workers to share their challenges during joint monitoring visits Review health workers’ job descriptions and provide clear service delivery targets |
| Set a shared strategic direction | Constitute a team of representatives from the community, health service users, other health system stakeholders, and district health officers from each district to identify the health needs and challenges faced by the communities and to communicate these needs to the PPHCC for consideration while deciding their strategic direction Invite health facility shura members to meetings to better understand community health concerns |
| Steward resources responsibly | Train provincial public health office staff and health workers in ethical conduct Recognize health workers with outstanding performance Involve the community in health facility monitoring Use data, information, evidence, and technology for decision making |

**Table 1. Examples of Activities Selected by the PPHCCs to Implement Their Governance Action Plan**
Measures of Health System Performance

The focus of the study is health system performance, because it has a direct influence on population health outcomes. The governance intervention was not undertaken to improve governance for the sake of governance. Instead, the intention was to improve organizational or health system performance through improvements in governance. For this reason, the outcomes of interest we selected were health system performance indicators in addition to governance self-assessment scores.

We collected HMIS data on percentage achievement against the MOPH-established targets on nine indicators of health systems performance: (1) proportion of children less than one year of age who received the Penta 3 vaccine; (2) proportion of pregnant women who received at least one antenatal care visit; (3) proportion of women who received at least one postnatal care visit; (4) proportion of pregnant women who received two doses of tetanus toxoid; (5) proportion of deliveries conducted at a health facility; (6) outpatient visit rate per person; (7) community health worker home visit rate; (8) proportion of new family planning users in target population; and (9) tuberculosis (TB) case detection rate. In addition, the TB cure rate was chosen as a health outcome variable because TB is highly prevalent and is a public health priority in Afghanistan.

Why did we select these indicators? We expected to see a change in maternal and child health indicators because maternal and newborn care and child health and immunization are the top two priority elements among the seven elements of the Basic Package of Health Services, which is a mainstay of primary health care in Afghanistan. Likewise, family planning and tuberculosis control are top public health priorities of the MOPH and provincial health systems in Afghanistan. Any systemic improvement in the provincial and district health systems—for example, its governance—was therefore expected to be reflected in the indicators related to maternal and child health, family planning, and tuberculosis.

Health system strengthening interventions focusing on improving leadership, management, governance, or financing will have a direct bearing on the coverage of health services and on access to the health services the system delivers. Hence, we expected to see improvement in these indicators.

Composite Measure of Health System Performance

We estimated the coefficients of correlation for the outcome measures and tested their statistical significance. Because the indicators were found to be highly correlated and seemed to be measuring one underlying phenomenon such as access to care, utilization of care, or service volume rather than measuring independent aspects of health system performance, we constructed a composite index employing linear combination of the outcome measures and subjected it to the same analysis as individual outcome measures.

Governance Measurement

We developed two self-assessment instruments to measure governance performance and to be used by committees as a whole. These instruments were based on the extant role of the committees and the expanded role they aspired to take on to make their governance more effective and people centered. The two measurement instruments are summarized in Table A (please see supplemental files) and are available in full in the Appendix 2. Both Table A same and Appendix 2 are contained in Supplemental File 1.

One of the two instruments was for self-assessment of performance on the PPHCC governance responsibilities. The PPHCCs graded their own performance on a one to ten scale on each responsibility of the committee. The other instrument helped the PPHCCs self-assess their governance against established standards in 11 provincial public health core functions. No progress on a standard was scored zero, 1%–25% accomplishment was scored one, 26%–50% was scored two, 51%–75% was scored three, and 76%–100% was scored four.

Timeline

Afghanistan has 34 provinces, 16 of which implemented the governance intervention. The 18 nonintervention provinces served as comparison provinces. The MOPH and the United States Agency for International Development’s (USAID) Leadership, Management, and Governance (LMG) Project, which assists the MOPH, selected provinces based on where the LMG Project was active. Thus, the selection of provinces was purposeful instead of random.

The provinces were staggered in their implementation of the governance intervention over a period of 27 months—three provinces implemented it from April to October 2012 (Sawar to Mizan of solar year [SY] 1392), nine provinces did so from July to December 2013 (Saratan to Qaws of SY 1393), and the remaining four provinces implemented it from February to July 2014 (Dalwa of SY 1393 to Saratan
of SY 1394). Figure 1 depicts the timeline in terms of the Gregorian calendar.

Identification Strategy

After the fall of the Taliban regime in 2001, USAID and others, notably, the World Bank and European donors, invested heavily in rebuilding the health services in Afghanistan.

Subnationally, USAID support was concentrated in 16 provinces, whereas other donors dedicated their efforts in the remainder of the provinces. USAID funded a series of projects; the LMG Project was implemented during 2012–2015. It covered 16 USAID-supported provinces, and these 16 provinces were the setting of the governance intervention that is subject matter of this study. This was a convenience sampling because the intervention was implemented in the provinces where the LMG Project operated, using LMG funding.

The intervention coincided with the LMG Project in time. LMG did not introduce any new activities while the governance intervention was being rolled out. Nevertheless, this poses a significant challenge in terms of confounding and omitted variable bias in attributing the results to the governance intervention versus the USAID support in general and LMG program activities in particular. We not only employ several strategies and robustness checks to overcome this challenge but also frame and report caveats regarding the results accordingly.

Sample Size

Province-month or the month in which a province was observed is the unit of analysis for analyzing the impact of intervention on the health system performance indicators. We had 13 months of pre-intervention data when none of the provinces had the intervention introduced. Similarly, we had eight months of postintervention data when all 16 intervention provinces had completed their intervention. Thus, there were a total of 714 province-months in the analysis sample.

Model

We used the difference-in-differences analysis setup where outcomes are observed for two groups for two time periods. One of the groups (intervention provinces) is already exposed to the treatment (provincial health governance intervention) in the post period but not in the pre period. The second group (comparison provinces) is not exposed to the treatment during either period. Because we observe the same provinces within the group in each time period, the average gain in the comparison provinces is subtracted from the average gain in the intervention provinces. This removes biases in second period comparisons between the two groups that could be the result of permanent differences between those groups, as well as biases from comparisons over time in the treatment group that could be the result of time trends.

Data varies by province (i) and month (t). The outcome is \( Y_{it} \), and there are two periods: pre and post. The intervention will occur in a group of provinces. There are three key variables: \( \text{Intervention}_{it} \), \( \text{Post}_{it} \), and \( \text{Intervention}_{it} \times \text{Post}_{it} \) (or \( \text{Intervention} \times \text{Post} \)).

\[
Y_{it} = \beta_0 + \beta_1 \text{Intervention}_{it} + \beta_2 \text{Post}_{it} + \beta_3 (\text{Intervention}_{it} \times \text{Post}_{it}) + e_{it}
\]  

(1)
Intervention_{it} \times Post_{it} is the interaction term; that is, intervention provinces after the intervention.

The coefficient of our interest is $\beta_3$, which multiplies the interaction term (Intervention_{it} \times Post_{it}). $\beta_3$ denotes the true effect of treatment or the effect of treatment on the treated.

We also use the following extended form of this model that controls for more variables:

$$
Y_{it} = \beta_0 + \beta_1 \text{Intervention}_{it} + \beta_2 \text{Post}_{it} + \beta_3 (\text{Intervention}_{it} \times \text{Post}_{it}) + \beta_4 \text{Poverty}_{it} + \beta_5 \text{LaborParticipationRate}_{it} + \beta_6 \text{FemaleLiteracyRate}_{it} + \beta_7 \text{Security}_{it} + \epsilon_{it},
$$

where Poverty is the poverty headcount rate in the province, and security denotes the security rating in the province based on a scale of one (worst security) to five (acceptable security as decided by NATO during this time for transition purposes).

The poverty headcount rate, labor participation rate, and female literacy rate were added because of their likely influence on the outcome variables. Data on these rates were taken from provincial briefs published by the World Bank in June 201118.

Robustness Checks

One crucial assumption for difference-in-differences estimations is the exogeneity of the policy implementation. A question might be posed whether the governance intervention was exogenous in this case. The intervention provinces were the ones already being assisted by USAID for a long time. The comparison provinces were assisted by other donors, the European Union, and the World Bank, which might bias the results. We had no direct way to find out whether the better results were driven by the long-term work of USAID compared with other donors.

For this purpose, we conducted a series of robustness checks. To begin with, these included a placebo test treating months seven to 13 of the pre-intervention period as the postintervention period. More checks followed.

Phased Implementation of the Model

The implementation of the six-month intervention was phased across the study provinces; it was done in three installments. Three provinces were covered in the first wave, nine in the second wave, and four in the third wave.

Months one to 13 were the pre-intervention period. The initial three provinces implemented the intervention during months 14–19, nine provinces during months 28–33, and four provinces during months 35–40. Months 41–48 was overall postintervention period.

Taking advantage of the phased implementation, we tested whether the impacts followed the same phasing pattern as the implementation. Twelve provinces had undergone the intervention by the end of month 33. We compared the measures in 13 months of pre-intervention period (months one to 13) to the measures in seven months (months 34–40) immediately after the second phase was complete. This comparison was done between the 12 provinces that had completed the intervention and 18 provinces that were not expected to implement the intervention at all. The four provinces of the third wave were left out of this analysis. The province and time fixed effects and covariates were included in the model. In essence, we combined Phase 1 and Phase 2 intervention provinces and all 18 comparison provinces and implemented the model.

Per-Protocol Analysis—Governance Scores as a Proxy for Uptake of the Intervention

Per-protocol analysis is an analysis of treatment group that includes only those provinces that completed the intervention out of the originally allocated provinces. If done alone, this analysis might lead to bias; we did it in conjunction with a multitude of tests stated above.

For this purpose, we simultaneously tested whether self-assessed governance scores and governance activity completion predict changes in the outcome indicators within the intervention group. This constituted a type of per-protocol analysis using self-assessed governance scores and governance activity completion scores as a proxy for uptake of the intervention.

RESULTS

Governance Action Plan Implementation

The PPHCCs implemented many specific governance actions. For example, they invited religious, youth, and women leaders to PPHCC meetings; provided feedback to health facility consultative council members; ensured that they better assessed, understood, and addressed community health concerns; shared information on resources and performance with communities and stakeholders; encouraged health workers to share their challenges during joint monitoring visits; recognized health workers for outstanding
performance; involved the community in health facility monitoring; and used data, information, and evidence for PPHCC decision making. At the end of the six-month intervention period, they assessed their performance in implementing these governance actions.

Figure 2 depicts the progress of the intervention provinces in implementing governance action plans at the end of the six-month implementation phase. As mentioned earlier, the provinces were staggered in their implementation of the intervention. Three provinces that implemented the intervention in the first phase and nine provinces (five plus four) that implemented the intervention in the second phase are shown in the chart through three bars. Four provinces that implemented the intervention in the third and final installment did not carry out the postintervention self-assessment and hence do not appear in the chart.

The figure shows that the intervention provinces reported a high level of completion of their governance development action plans. On average, the intervention provinces completed 55% of their action plan activities in six months, and an additional 29% were at an intermediate stage of completion. The committees planned on continuing more than 90% of these actions in the future beyond the original six-month implementation period.

Governance Measurement Results

PPHCCs of the intervention provinces self-assessed their governance performance at baseline and again after six months of intervention (see Table B in Supplemental File 1 and Figure 3). PPHCCs of the nonintervention provinces did not do these self-assessments. Overall, we found significant improvements in self-assessed governance scores. PPHCCs improved their governance score on average by 23.7% and 22.6% using two different scales (one based on roles and responsibilities [47 items; \( \alpha = 0.91 \)] and the other based on governance standards [46 items; \( \alpha = 0.97 \)]). The overall improvement upon adding the scores from both scales is 23.4%. Improvement was higher in the provinces that began with a lower baseline governance score. The intervention provinces scored higher on both governance measurement scales. In the study, governance intervention was a means to improve health system performance. Let us now turn to the results of health system performance measurement.

Health System Performance

We show the descriptive statistics in Table C in Supplemental File 1. Over the 48-month period for which HMIS data were collected, the performance of provinces (both intervention and comparison) was more than 200% of the MOPH-established target for the outpatient department (OPD) visit rate per person and tetanus toxoid administration. However, this figure may be the result of the MOPH establishing a very low target for these indicators. In the particular case of tetanus toxoid administration, it may also be due to the health staff reporting each of the two doses separately. Performance was also more than 100% of the MOPH-established target for antenatal care visits and Penta 3 immunization. Provinces performed less than 100% of the MOPH-established target for postnatal
care visits, facility delivery, and TB case detection rate and cure rates and less than 50% of the MOPH-established target for community health worker home visits and new family planning users.

As seen in Table 2, eight of ten indicators increased significantly \( P < 0.01 \) from the pre period to the post period in the intervention provinces. The new family planning user rate and TB cure rate did not experience significant rises. Similarly, eight of ten indicators increased significantly \( P < 0.01 \) for seven indicators and \( P < 0.05 \) for one indicator in nonintervention provinces. The TB case detection rate and TB cure rate did not significantly improve. Difference-in-differences was statistically significant for four variables: antenatal care visits \( P < 0.05 \), postnatal care visits \( P < 0.01 \), Penta 3 immunization \( P < 0.01 \), and the OPD visit rate per person \( P < 0.05 \).

We performed a significance test in the pre-intervention period to see whether the intervention and comparison provinces were similar in profile in terms of the ten indicators; that is, whether there was a parallel trend in the pre-intervention period. Intervention facilities had on average lower achievements in Penta 3 immunization, antenatal visits, postnatal visits, tetanus toxoid administration to pregnant mothers, outpatient department visits, and new family planning users but had higher achievements in facility delivery, community health worker home visits, and tuberculosis case detection and cure. We performed \( t \)-tests to see whether these differences were statistically significant. See Table 3 for results.

During the pre-intervention period, there is no statistically mean difference, at a 0.05 level of significance, in the achievements in six areas—that is, Penta 3 immunization, antenatal visits, postnatal visits, facility delivery, community health worker home visits, and tuberculosis case detection and cure—between intervention and comparison provinces.

There are statistically significant differences, at a 0.05 level of significance, between intervention and comparison provinces in the achievements in four areas; that is, tetanus toxoid administration to pregnant mothers, outpatient department visits, community health worker home visits, and tuberculosis case detection.

We plotted mean monthly achievement rates for the indicators over the 13-month pre-intervention period and eight-month postintervention period. See Figures 4–13 in Supplemental File 2 for these plots. Months one to 13 are the pre-intervention period and months 41–48 are the postintervention period. Note that pre-intervention trends are approximately parallel for the first nine of the ten plots. Figures 4–13 in Supplemental File 2 show the monthly average for each of the ten indicators in terms of percentage achievement against the MOPH-established targets in the pre-intervention and postintervention periods.

**Difference-in-Differences Regression Analysis**

We conducted difference-in-differences regression analysis. We began with model 1, which had three key variables: Intervention, Post, and Intervention \(*\) Post. In model 2, we added four covariates: poverty headcount rate of the province, labor force participation rate of the province, female literacy rate of the province, and its security categorization. Finally, we added province and time fixed effects in model 3. See Table 4.

**Full Model with Province and Time Fixed Effects**

In the full model, the coefficient on the Intervention \(*\) Post variable is statistically significant for achievements in antenatal and postnatal care visits, facility delivery, Penta 3 immunization, community health worker home visits, new family
### TABLE 2. Health System Performance and Health Outcomes, Pre- and Postintervention Periods

| Number | Performance Indicator | Intervention Provinces | Comparison Provinces | Difference-in-differences | P value |
|--------|-----------------------|------------------------|----------------------|---------------------------|---------|
|        |                       | Pre-intervention | Postintervention | Difference | Conf. Interval | Pre-intervention | Postintervention | Difference | Conf. Interval |                   |         |
| 1      | Penta 3               | 124 (28)            | 148 (70)            | 24**        | [14,35]       | 129 (31)         | 136 (37)         | 7*         | [1, 15]       | 14**              | 0.0087  |
| 2      | One antenatal care visit | 111 (34)           | 136 (36)            | 24**        | [17,32]       | 114 (36)         | 125 (31)         | 11**       | [4, 18]       | 14*               | 0.0112  |
| 3      | One postnatal care visit | 69 (23)             | 98 (27)             | 29**        | [24,35]       | 72 (33)          | 90 (34)          | 17**       | [11, 24]      | 12**              | 0.0085  |
| 4      | Facility delivery     | 53 (22)             | 74 (27)             | 22**        | [16,27]       | 50 (23)          | 66 (27)          | 16**       | [11, 21]      | 5                 | 0.1497  |
| 5      | Two doses of tetanus toxoid | 175 (78)            | 350 (71)            | 175**       | [159, 192]    | 199 (84)         | 365 (118)        | 166**      | [145, 186]    | 10                | 0.4684  |
| 6      | OPD visit             | 176 (44)            | 241 (48)            | 66**        | [55,76]       | 208 (62)         | 256 (70)         | 48**       | [34, 61]      | 18*               | 0.0442  |
| 7      | Community health worker home visit | 36 (14)    | 42 (17)             | 6**         | [2, 9]        | 21 (14)          | 29 (16)          | 8**        | [5, 11]       | 2                 | 0.6827  |
| 8      | New family planning user | 18 (8)             | 20 (8)              | 1           | [0.2, 3]      | 19 (8)           | 22 (7)           | 3**        | [1, 5]        | 1                 | 0.2376  |
| 9      | TB case detection     | 77 (34)            | 91 (44)             | 14**        | [5, 22]       | 68 (44)          | 71 (37)          | 3         | [12, 6]       | 11                | 0.0800  |

124 (28) in the first row should be read as M (SD) (i.e., mean = 124 and standard deviation = 28). These numbers are the percentage achievement against the MOPH-established target. For example, Penta 3 immunization = 124 indicates that intervention provinces had achieved 124% of the target set by the MOPH for immunization of children below one year of age with pentavalent vaccine during the pre-intervention period. A difference of 24 in the fifth column of the first row means a difference of 24 percentage points. Indicators one to eight are calculated as the percentage achievement as against MOPH-established targets and not counts.

208 observations in the pre period and 128 observations in the post period (total 336 observations).

234 observations in the pre period and 144 observations in the post period (total 378 observations).

P value was obtained by conducting two-sample equal variance two-tailed t-tests.

*P < 0.05. **P < 0.01.
planning users, and the OPD visit rate per person and TB case detection rate as dependent variables. At baseline, there was no statistically significant difference between the intervention and comparison provinces in terms of achievement in Penta 3 immunization, tetanus toxoid administration to pregnant mothers, the TB case detection rate, and the TB cure rate. However at baseline, the intervention provinces had higher achievement rates in antenatal and postnatal care visits, facility delivery, OPD visits, community health worker home visits, and new family planning users. There was a statistically significant secular trend of increase in all of the indicators except the TB cure rate, which showed a statistically significant secular trend of decrease with time.

Treatment (i.e., the governance intervention) significantly predicted the eight outcome variables (see coefficient on Intervention * Post variables): Penta 3 immunization achievement, $R^2 = 0.54$, $F(46, 667) = 17.41$, $P = 0.0000$; antenatal care visits, $R^2 = 0.73$, $F(46, 667) = 39.45$, $P = 0.0000$; postnatal care visits, $R^2 = 0.81$, $F(46, 667) = 63.60$, $P = 0.0000$; facility delivery, $R^2 = 0.83$, $F(46, 667) = 71.62$, $P = 0.0000$; the OPD visit rate per person, $R^2 = 0.84$, $F(46, 667) = 79.15$, $P = 0.0000$; community health worker home visits, $R^2 = 0.91$, $F(46, 667) = 157.61$, $P = 0.0000$; new family planning users, $R^2 = 0.81$, $F(46, 667) = 64.36$, $P = 0.0000$; and the TB case detection rate, $R^2 = 0.68$, $F(46, 667) = 30.89$, $P = 0.0000$. It is important to note that the intervention explained a significantly higher proportion of variance in model 3 compared to model 1. That is, the intervention explained at least 50% of the variance, whereas model 1 explained less than 25% of the variance.

On average, the governance intervention increased a province’s OPD visit rate per person by 18 percentage points, Penta 3 immunization achievement by 17 percentage points, antenatal visit achievement by 14 percentage points, postnatal visit achievement by 12 percentage points, facility delivery achievement by 5 percentage points, and the TB case detection rate by 11 percentage points. On the contrary, the intervention decreased a province’s achievement in new family planning users by one percentage point and community health worker home visits by two percentage points. The governance intervention did not have an impact on the remaining two variables: tetanus toxoid administration to pregnant mothers and the TB cure rate.

### Correlation between the Outcome Measures

Coefficients of correlation were estimated for the outcome measures. Statistical significance was also tested. In social sciences, correlation coefficients of 0.10, 0.30,
| Variable                      | Model 1—Basic Model | Model 2 with Covariates | Model 3 with Province and Time Fixed |
|-------------------------------|---------------------|-------------------------|-------------------------------------|
|                               | B    | SE   | β    | B    | SE   | β     | B    | SE   | β     |
| Penta 3 Intervention          | 4.93 | 3.93 | 0.05 | 9.24*| 3.96 | 0.10* | 1.36 | 6.14 | 0.01  |
| Post                          | 7.53 | 4.37 | 0.08 | 7.53 | 4.30 | 0.08  | 9.92**| 3.29 | 0.11**|
| Intervention * Post           | 16.81**| 6.38 | 0.15**| 16.81**| 6.27 | 0.15**| 16.81**| 4.53 | 0.15**|
| Poverty                       | 0.26* | 0.08 | 0.11**| 0.26* | 0.08 | 0.11**| 0.44* | 0.16 | 0.19**|
| Poverty                       | 0.07 | 0.12 | 0.02  | 0.07 | 0.12 | 0.02  | 0.73**| 0.24 | 0.25**|
| Security                      | 0.68* | 0.34 | 0.09* | 0.68* | 0.34 | 0.09* | 1.35**| 0.39 | 0.18**|
| Security                      | 4.49**| 1.38 | 0.13**| 4.49**| 1.38 | 0.13**| 7.61**| 2.56 | 0.22**|
| R²                            | 0.0414 | 0.0796 |  | 10.23** | 8.72** |  | 0.5456 |  |
| F for change in R²            |  |  |  |  |  |  | 17.41** |  |
| Antenatal care Intervention   | 2.59 | 3.27 | 0.03 | 0.43 | 3.28 | 0.00  | 13.76**| 3.28 | 0.19**|
| Post                          | 10.91**| 3.64 | 0.14**| 10.91**| 3.56 | 0.14**| 10.91**| 3.56 | 0.14**|
| Intervention * Post           | 13.50* | 5.31 | 0.14* | 13.50* | 5.19 | 0.14* | 13.50**| 5.19 | 0.14**|
| Poverty                       | 0.20**| 0.07 | 0.10**| 0.20**| 0.07 | 0.10**| 0.15  | 0.07 | 0.07  |
| Labor force participation     | 0.09 | 0.10 | 0.04  | 0.09 | 0.10 | 0.04  | 1.11**| 0.10 | 0.45**|
| Female literacy               | 0.84**| 0.28 | 0.13**| 1.24**| 0.28 | 0.20**| 1.24**| 0.28 | 0.20**|
| Security                      | 2.37* | 1.15 | 0.08* | 1.33  | 1.15 | 0.04  | 1.33  | 1.15 | 0.04  |
| R²                            | 0.0616 | 0.1105 |  | 0.7127 | 0.05  |  | 0.05  |  |
| F for change in R²            | 16.61**| 12.53** |  | 39.45**| 39.45** |  | 39.45**| 39.45** |  |
| Postnatal care Intervention   | 3.37 | 2.80 | 0.05 | 2.42 | 2.75 | 0.03  | 7.23**| 2.94 | 0.11**|
| Post                          | 17.44**| 3.11 | 0.26**| 17.44**| 2.98 | 0.26**| 16.92**| 1.57 | 0.26**|
| Intervention * Post           | 12.03**| 4.53 | 0.14**| 12.03**| 4.35 | 0.14**| 12.03**| 2.17 | 0.14**|
| Poverty                       | 0.35**| 0.05 | 0.21**| 0.35**| 0.05 | 0.21**| 0.04  | 0.07 | 0.02  |
| Labor force participation     | 0.27**| 0.08 | 0.12**| 1.23**| 0.11 | 0.56**| 1.23**| 0.11 | 0.56**|
| Female literacy               | 0.39  | 0.23 | 0.07  | 0.83**| 0.18 | 0.15**| 0.83**| 0.18 | 0.15**|
| Security                      | 2.35* | 0.96 | 0.09  | 4.62**| 1.22 | 0.18**| 4.62**| 1.22 | 0.18**|
| R²                            | 0.1356 | 0.2080 |  | 0.8015 | 0.05  |  | 0.05  |  |
| F for change in R²            | 37.12**| 26.49** |  | 63.60**| 63.60** |  | 63.60**| 63.60** |  |
| Institutional delivery        | 2.41 | 2.32 | 0.04 | 3.25 | 2.32 | 0.06  | 7.06**| 2.31 | 0.13**|
| Post                          | 16.14**| 2.58 | 0.30**| 16.14**| 2.51 | 0.30**| 15.80**| 1.24 | 0.29**|
| Intervention * Post           | 5.46 | 3.76 | 0.08 | 5.46 | 3.67 | 0.08  | 5.46**| 1.71 | 0.08**|
| Poverty                       | 0.14**| 0.04 | 0.10**| 0.14**| 0.04 | 0.10**| 0.41**| 0.06 | 0.29**|
| Labor force participation     | 0.21**| 0.07 | 0.11**| 0.67**| 0.09 | 0.37**| 0.67**| 0.09 | 0.37**|
| Female literacy               | 0.61**| 0.20 | 0.13**| 0.27  | 0.14 | 0.06  | 0.27  | 0.14 | 0.06  |
| Security                      | 0.96  | 0.81 | 0.04  | 3.45**| 0.96 | 0.16**| 3.45**| 0.96 | 0.16**|
| R²                            | 0.1313 | 0.1712 |  | 0.8316 |  |  | 0.8316 |  |
| F for change in R²            | 35.77**| 22.04** |  | 71.62**|  |  | 71.62**|  |
| Two doses of tetanus toxoid   | 24.34**| 8.39 | 0.10**| 24.41**| 8.44 | 0.10**| 5.52  | 11.15 | 0.02  |
| Intervention                  | 165.61**| 9.33 | 0.66**| 165.61**| 9.16 | 0.66**| 183.68**| 5.98 | 0.73**|
| Post                          | 9.84  | 13.60 | 0.03 | 9.84  | 13.35 | 0.03  | 9.84  | 8.22 | 0.03  |
| Intervention * Post           | 0.54**| 0.18 | 0.08**| 0.54**| 0.18 | 0.08**| 0.85**| 0.29 | 0.13**|
| Poverty                       | 0.63* | 0.26 | 0.07* | 3.90**| 0.44 | 0.46**| 3.90**| 0.44 | 0.46**|
| Labor force participation     | 2.98**| 0.72 | 0.14**| 8.74**| 0.70 | 0.41**| 8.74**| 0.70 | 0.41**|
| Security                      | 5.20  | 2.95 | 0.05  | 13.44**| 4.64 | 0.14**| 13.44**| 4.64 | 0.14**|
| R²                            | 0.4737 | 0.4955 |  | 0.8192 |  |  | 0.8192 |  |
| Variable                                      | Model 1—Basic Model | Model 2 with Covariates | Model 3 with Province and Time Fixed |
|-----------------------------------------------|---------------------|-------------------------|--------------------------------------|
|                                               | $B$ | $SE$ | $B$ | $SE$ | $B$ | $SE$ | $B$ | $SE$ | $B$ | $SE$ | $B$ | $SE$ | $B$ | $SE$ | $B$ | $SE$ |
| **F for change in $R^2$**                     | 213.00**            | 99.06**                 | 65.71**                              |
| OPD                                           |                   |                         |                                      |
| Intervention                                  | 32.94**            | 5.41 0.25**             | 27.95** 5.11 0.21**                   | 33.76** 5.48 0.26** |
| Post                                          | 47.80**            | 6.01 0.36**             | 47.80** 5.54 0.36**                   | 50.62** 2.94 0.38** |
| Intervention * Post                           | 17.71* 8.77 0.10*  |                         | 17.71 8.08 0.10* 17.71 8.04 0.10*    | 17.71 4.04 0.10** |
| Poverty                                       |                   |                         | 0.84** 0.10 0.24** 0.84** 0.14 0.24** |                          |
| Labor force participation                     | 0.08               | 0.15 0.01               | 0.84** 0.21 0.18**                    |                          |
| Female literacy                               | 2.69**             | 0.44 0.24**             | 4.04** 0.34 0.36**                    |                          |
| Security                                      | 10.05**            | 1.79 0.19**             | 4.47 2.28 0.08                       |                          |
| **$R^2$**                                     | 0.2252             |                         | 0.8452                               |                          |
| **F for change in $R^2$**                     | 68.79**            |                         | 79.15**                              |                          |
| **Community health worker home visit rate**   |                   |                         |                                      |                          |
| Intervention                                  | 14.86** 1.43 0.43** | 15.32** 1.36 0.45**     | 35.61** 1.06 1.05**                   |                          |
| Post                                          | 7.81** 1.59 0.22**  | 7.81** 1.47 0.22**      | 7.37** 0.57 0.21**                    |                          |
| Intervention * Post                           | 2.08 2.32 0.04     | 2.08 2.15 0.04          | 2.08** 0.78 0.04                      |                          |
| Poverty                                       | 0.20**             | 0.02 0.22**             | 0.37** 0.02 0.41**                    |                          |
| Labor force participation                     | 0.20**             | 0.04 0.17**             | 0.65** 0.04 0.55**                    |                          |
| Female literacy                               | 0.38**             | 0.11 0.13**             | 0.01 0.06 0.00                       |                          |
| Security                                      | 1.55**             | 0.47 0.11**             | 3.70** 0.44 0.27**                    |                          |
| **$R^2$**                                     | 0.2121             |                         | 0.9158                               |                          |
| **F for change in $R^2$**                     | 63.72**            |                         | 157.61**                             |                          |
| **New family planning**                       |                   |                         |                                      |                          |
| Intervention                                  | 0.50               | 0.74 0.03               | 0.73 0.70 0.04                       | 4.77** 0.72 0.30**      |
| Post                                          | 2.91** 0.82 0.18**  | 2.91** 0.76 0.18**      | 2.99** 0.39 0.18**                    |                          |
| Intervention * Post                           | 1.46 1.20 0.07     | 1.46 1.11 0.07          | 1.46** 0.53 0.07**                    |                          |
| Poverty                                       | 0.03*              | 0.01 0.08*              | 0.11** 0.01 0.26**                    |                          |
| Labor force participation                     | 0.20**             | 0.02 0.37**             | 0.06* 0.02 0.11*                     |                          |
| Female literacy                               | 0.51**             | 0.06 0.38**             | 0.03 0.04 0.02                       |                          |
| Security                                      | 0.09               | 0.24 0.01               | 2.62** 0.30 0.42**                    |                          |
| **$R^2$**                                     | 0.0255             |                         | 0.8161                               |                          |
| **F for change in $R^2$**                     | 6.20**             |                         | 64.36**                              |                          |
| **TB case detection rate**                    |                   |                         |                                      |                          |
| Intervention                                  | 9.06* 3.79 0.11*   | 6.91 3.69 0.08          | 5.50 4.96 0.06                       |                          |
| Post                                          | 2.93               | 4.22 0.03               | 2.93 4.00 0.03                       | 2.66 0.06*              |
| Intervention * Post                           | 10.79 6.15 0.10    | 10.79 5.84 0.10         | 10.79** 3.66 1.00**                   |                          |
| Poverty                                       | 0.31**             | 0.07 0.14**             | 0.05 0.13 0.02                       |                          |
| Labor force participation                     | 0.10               | 0.11 0.03               | 0.04 0.19 0.01                       |                          |
| Female literacy                               | 0.43               | 0.31 0.06               | 1.47** 0.31 0.21**                   |                          |
| Security                                      | 7.09**             | 1.29 0.22**             | 7.39** 2.06 0.23**                    |                          |
| **$R^2$**                                     | 0.0397             |                         | 0.6805                               |                          |
| **F for change in $R^2$**                     | 9.78**             |                         | 30.89**                              |                          |
| **TB cure rate**                              |                   |                         |                                      |                          |
| Intervention                                  | 2.37               | 3.66 0.03               | 0.04 3.64 0.00                       | 9.22 7.01 0.11           |
| Post                                          | 4.60               | 4.07 0.05               | 4.60 3.95 0.05                       | 8.46* 3.76 0.10*        |
| Intervention * Post                           | 9.04 5.93 0.09     | 9.04 5.77 0.09          | 9.04 5.17 0.09                       |                          |
| Poverty                                       | 0.34*              | 0.07 0.16               | 0.33 0.18 0.16                       |                          |
| Labor force participation                     | 0.20               | 0.11 0.07               | 0.10 0.27 0.03                       |                          |
| Female literacy                               | 1.59**             | 0.31 0.23**             | 0.72 0.44 0.10                       |                          |
| Security                                      | 4.51**             | 1.27 0.14**             | 2.81 2.92 0.09                       |                          |
| **$R^2$**                                     | 0.0089             |                         | 0.3786                               |                          |
| **F for change in $R^2$**                     | 2.14               |                         | 5.97**                               |                          |

* $p < 0.05$.  ** $p < 0.01$.  

**TABLE 4.** Effect of the Intervention on Health System Performance and Health Outcomes (Regression Coefficients)
and 0.50 regardless of sign are interpreted as small, medium, and large, respectively. In the pre-intervention period and on average, there is a moderate to strong and statistically significant correlation between achievements in the Penta 3 immunization, antenatal care visits, postnatal care visits, OPD visit rate, and institutional delivery. See Table D in Supplemental File 1. We also found statistically significant and mild to moderate correlation between these outcome measures and tetanus toxoid administration, new family planning users, and TB case detection rate. In addition, community health worker home visit rate is correlated with three other measures and TB cure rate with two other measures.

Overall, the indicators are highly correlated; all of the indicators except TB cure rate are indicators of access to public health service or its utilization. They indeed seem to be measuring one underlying phenomenon such as access to care, utilization of care, or service volume.

We conducted difference-in-differences analysis with the composite index of outcome measures as a predicted variable and ran the three models that we used for the individual outcome measures. Treatment (the governance intervention) significantly predicted the composite outcome; the full model with province and time fixed effects and other covariates had $R^2 = 0.80$, $F(46, 667) = 59.71$, $P = 0.0000$. See Table E in Supplemental File 1. On average, the governance intervention increased a province’s composite outcome by 9.14 percentage points.

**Sensitivity Analysis**

To verify whether results were mixing up the effect of the intervention with some other unobservable trend or confounding factor, we conducted a series of robustness checks. We found our results to be robust according to all of the checks we carried out.

The pre-intervention period spanned the first 13 months of the data. We conducted a “placebo test” on these data where the initial six months are treated as the pre-intervention period and months seven to 13 are treated as the postintervention period. We should not see any impact of the intervention in this placebo test because, in reality, the intervention had not occurred during this period.

Table F in Supplemental File 1 shows the results of the placebo test. As expected, we did not find any impact of the placebo intervention on Penta 3 immunization rates. The coefficient on the Intervention * Post variable was not statistically significant. The result goes against the potential endogeneity of the governance intervention (getting the causation wrong).

**Phasing Test**

As a next step, we tested whether the impacts followed the same phasing pattern as the implementation. The results of this test are presented in Table G in Supplemental File 1. We found that the impacts largely followed the same phasing pattern as the implementation. We see a statistically significant impact of the intervention on Penta 3 immunization, antenatal care visits, postnatal care visits, OPD visit rate, TB case detection rate, and TB cure rate but not on institutional delivery, tetanus toxoid administration, and community health worker home visit rate. Achievements in the new family planning users showed a marginally negative impact.

The intervention had a positive and statistically highly significant relationship with six outcome measures in the smaller number of intervention provinces and in the postintervention period of seven months that predates the postintervention period in the main analysis of this study. We expected to see the relationship follow the phasing pattern, and we see it.

**Governance Scores as Predictors**

Finally, we simultaneously tested whether self-assessed governance scores and governance activity completion predict changes in the outcome indicators within the intervention group. The findings of this check are presented in Table H in Supplemental File 1. Self-assessed governance scores at the end of the governance intervention had a positive, statistically significant and a clinically significant relationship with the achievements in Penta 3 immunization, antenatal care visits, postnatal care visits, institutional delivery, OPD visit rate, community health worker home visit rate, and TB cure rate but not with tetanus toxoid administration and TB case detection rate. Achievements in the new family planning users showed a negative association.

On the other hand, governance activity completion scores at the end of the governance intervention showed a positive and statistically significant relationship only with TB cure rate.

**DISCUSSION**

How an organization or health system is governed is a determinant of its performance. We had hypothesized that the governance intervention would have a positive impact on the health system performance indicators used in the study; we found evidence of the beneficial impact per our hypothesis. We also found that health systems’ governance can be improved, even in fragile and conflict-affected environments.
The health system performance indicators we used in the study are highly correlated and seem to be measuring access to service, service provision, and service utilization. Governance leaders are likely to prioritize access to services for their constituents and the use of services by their constituents. Thus, the governance intervention had a logical linkage with the indicators used in the study.

The PPHCC members designed their action plan in a participatory and consultative manner. This seemed to foster a sense of responsibility to successfully implement it. The intervention was focused on people; that is, health system leaders governing in close partnership with health managers, health providers, health workers, community leaders, health service users, and governance leaders in other sectors. This helped ensure that the intervention was meaningful for the governance leaders as well as for the community.

As health systems become decentralized, subnational structures and committees are entrusted with the responsibility to coordinate, implement, and oversee health services; they are expected to play a governance role. That they are closer to the people helps. Governing bodies at the community level can represent the unresolved health needs of their communities to governing bodies at the district and provincial levels, which may have more resources to address them.

We discovered that interventions to improve governance skills are feasible in fragile and conflict-affected environments, when practices of good governance are consistently applied, periodically assessed, and continuously improved.

We saw a significantly positive impact on six indicators of provincial health system performance, a marginally negative impact on two indicators of provincial health system performance, and no impact on the remaining one indicator of health system performance and one indicator of health outcomes. We found a significant positive impact on achievement of antenatal and postnatal care visits, facility delivery, Penta 3 immunization, outpatient department visits, and TB case detection. There was no impact on achievements in tetanus toxoid administration to pregnant mothers and the TB cure rate. We also saw a marginally negative impact on community health worker home visits and new family planning users though the size of this negative effect is small; that is, less than two percentage points.

There could be several reasons for these mixed results—six positive, two null, and two negative.

First, maximizing antenatal and postnatal care, facility delivery, immunization, OPD visits, and tuberculosis case detection have been health service priorities nationwide; the PPHCCs in the intervention provinces might have given them even higher priority. Nevertheless, the remaining indicators are also important national priorities. Second, antenatal and postnatal care, facility delivery, immunization, OPD visits, and tuberculosis case detection might have been “low hanging fruit.” More difficult-to-achieve indicators (for example, TB cure) could not be accelerated during the six months of intervention. However, at this time, we do not know whether more time would have made a difference. It is also possible that the PPHCCs did not sustain their improved governing behaviors long enough to have a statistically and clinically significant impact on the four intractable indicators.

Third, it might be the case that insecurity posed disproportionate hurdles in the intervention provinces. Fourth, the governance intervention in and of itself might not be enough to make a difference to the remaining four intractable indicators. In other words, those indicators may have also needed an intervention at the health service management level or service delivery level or perhaps at a combination of both levels. Interventions at the health manager, provider, or patient level could potentially have helped. Finally, all of the intervention provinces have been assisted by USAID for more than a decade, whereas other provinces were assisted by other donors (the European Union and the World Bank) for a similar length of time. There might have been a qualitative difference in the support provided by USAID when compared to the other donors. It is possible that the intervention provinces were comparatively well prepared to derive disproportionate benefit from the intervention or at least in the six areas where we saw improvements.

Strengths

Our study has several strong points. It examines the contribution of governance to health system performance and generates early evidence in this regard using a rigorous quantitative method. It builds on the project’s earlier work in the field and establishes the link between the governance of a health system and its performance.16

Encouraged by its potential impact on health system performance, the Ministry of Public Health has approved the PPHCC Governance Guide, a product of the study, for nationwide scale-up. Our study results are relevant to the situation in countries where weak health systems have been a significant barrier to effectively addressing outbreaks and epidemics and to providing good quality health services to citizens. The international donors and development partners working in these countries are looking for ways to strengthen the health systems; improving their governance is a promising way to do this.

Limitations

These findings may not be generalizable to all low- and middle-income countries. However, our study does invite
readers to make connections between its elements and their own experience. Moreover, the evidence generated by our study is significant given that there is a scarcity of evidence in this area. The difference-in-differences method has several shortcomings, including possible endogeneity of the interventions themselves, issues relating to the standard error of the estimate, and requirement of a parallel trend assumption.\(^\text{19}\)

Moreover, effects identified by difference-in-differences may not have a causal interpretation if the policy change occurred in a jurisdiction that derives unusual benefits from doing so.\(^\text{20}\) All of the intervention provinces in our study were USAID-assisted provinces, whereas most of the comparison provinces were assisted by other donors. We do not know whether the intervention provinces were able to derive unusual benefits from the governance intervention because they were comparatively better prepared in health management and/or health service delivery. This might be the case because, in all of the intervention provinces, the provincial public health advisor embedded in the provincial public health office had been providing public health management support for years before the intervention began. The comparison provinces did not have such advisors for any considerable length of time.

The simplicity of the difference-in-differences method comes at a price in terms of assumptions. To obtain impact estimates, the crucial identifying assumption one has to make is that the counterfactual trend is the same for treated and nontreated units.\(^\text{21}\) This assumption can only be tested if more data are available.

The identifying assumption requires the investigators to assume that whatever happened to the control group over time is what would have happened to the treated group in the absence of the program.\(^\text{22,23}\) It is a relatively strong assumption and tends to overlook all other possible differences between the groups that could have led to the observed outcomes. The difference-in-differences method attributes any differences in trends between the treatment and control groups to the intervention as long as those differences occur at the same time as the intervention. The estimation becomes biased if there are other factors that affect the difference in trends between the two groups.\(^\text{24,25}\)

To mitigate this methodological limitation, we demonstrated a broadly parallel trend during the pre-intervention period by plotting mean monthly rates of all health system performance variables during the 48-month period that includes the 13-month pre-intervention period. We also performed \(t\)-tests in the pre-intervention period to see whether the intervention and comparison provinces were similar in profile in terms of the ten indicators. Our results also passed the placebo and robustness checks.

In the study, we exploit the variation introduced by the phasing. Our results are strengthened because the impacts were observed to follow the same phasing pattern as the implementation. This also provided variation in the intervention orthogonal to the LMG project, which could allay some of the internal validity concerns; that is, the LMG itself or the LMG in combination with the governance intervention may drive observed impacts.

We also established that end-of-the-intervention self-assessed governance scores are able to predict changes in the outcome indicators within the intervention group. This further strengthens our conclusion because the intermediate outcome (improved governance), which is more direct outcome of the governance intervention, is seen to be driving the ultimate results.

Another limitation of the study is its short duration. We do not know whether six months was enough for the governance intervention to have an effect on health system performance.

The Hawthorne effect (i.e., governance improved because governance leaders modified their behavior for the purpose of the assessment and because their performance was being observed) could also be a plausible alternative explanation for the results. Governance self-assessments in comparison jurisdictions could have either refuted or established the Hawthorne effect as the reason for improvement in governance scores. We could not carry out these assessments due to a lack of time and resources.

PPHCC members measured governance by conducting the self-assessments collectively as a group. There is an element of subjectivity in the self-assessments. We reduced this bias by designing and conducting collective self-assessments. Group self-assessments are less vulnerable to subjectivity than individual self-assessments because group processes can moderate overrating—if one member of a group overrates performance on an item, another group member can bring this to the attention of the group, which can in turn affect the group’s final rating of that item.

**Areas for Future Research**

This study yields directions for future research. Our intervention lasted six months; we recommend that governance interventions of longer duration be the subject of future studies. Governance improvements might need time to translate into improvements in health system performance at the health facility level. They might need to be implemented over a sustained period of time to realize gains in health system performance.

Governance is an enabler of management and management is an enabler of service providers. Our intervention focused on governance from the perspective of the people who govern; it did not directly involve health managers or service
providers. All three groups have a role to play in improving health governance. In addition, the provinces sit between the national ministry at the top and the districts, health facilities, and communities below. Governance happens at all of these levels, but our intervention only focused on the provincial level. We recommend future studies of interventions at the different levels, as well as complex multidimensional and multilevel studies.

There is also a case to be made for conducting similar interventions and research in different types of organizations delivering health services—public organizations, civil society organizations, and private for-profit organizations—to examine the link between their governance and their organizational or health system performance. There is a multitude of sophisticated studies examining the link between corporate governance and profitability of a firm, but we hardly find such studies examining the link between health systems governance and system performance.\(^{25-28}\)

Cost-effectiveness studies are also lacking in this arena, including comparing the cost-effectiveness of implementing a governance intervention on the top of a public health intervention to implementing only a public health intervention. Finally, this is mainly a quantitative study. More qualitative or mixed methods studies should be done in the future to open the “black box” that sits between governance and organizational performance.\(^{29}\)

**Implication for Practice**

Our study has an implication for practice. Entry points for improving governance in the health sector may not be readily obvious to policy makers. Governing bodies have the potential to contribute to improved health services and the health status of populations. Often they do not get necessary support in terms of clear mandates, authority, and resources. In this study, we have described an approach to governance development working with a set of provincial health governing bodies that improved their province’s health system performance. This approach could be of interest to governing bodies at other levels of the health sector.

**CONCLUSION**

We conclude that a provincial health governance intervention can positively impact health system performance and document such a beneficial impact in this study. However, this potential cannot be taken for granted. We still do not know whether the impact is generalizable regardless of time or place. We saw a beneficial impact in two out of every three health system performance indicators that were included in the study. This is not to imply that these interventions are not worthy of consideration. Instead, they need to be studied more and the results documented more systematically.

**NOTES**

[a] Intervention provinces (16): Badakhshan, Baghlan, Bamyan, Farah, Faryab, Ghazni, Helmand, Hirat, Jawzjan, Kandahar, Ghost, Nimroz, Paktika, Paktya, Takhar, and Wardak.

[b] Comparison provinces (18): Badghis, Balkh, Dykundi, Ghor, Kabul, Kapisa, Kunar, Kunduz, Laghman, Logar, Nangarhar, Nooristan, Panjsher, Parwan, Samangan, Sar-e-Pul, Urozgan, and Zabul.

**DISCLOSURE OF POTENTIAL CONFLICTS OF INTEREST**

The author declares that he has or had no competing interests.

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AVAILABILITY OF DATA AND MATERIALS
The data set supporting the conclusions of this article has been made available with the article as Data File (Excel).

ETHICS APPROVAL AND CONSENT TO PARTICIPATE
The author did not go to Institutional Review Board (IRB) because the study is based on secondary data analysis. He has analyzed HMIS data of the Ministry of Public Health that are not identifiable; they are aggregate data with no identifiers whatsoever. Secondary data analyses are exempt from IRB review. This research does not meet the definition of “human subjects” research requiring IRB review.

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