

8 FACILITY LEVEL EXPLANATIONS OF PERFORMANCE

8.1 Introduction

The statistics presented in Chapters 3 to 7 have aimed to summarise important characteristics at the facility level. The averages presented in the tables and charts have enabled comparisons of average facility performance across points in time, facility types, province, and agency. They have shown many interesting differences. We have attempted throughout the report to explain these differences. For example, it seems likely that schools have fared better than health clinics over the last decade because they have been better financed, better governed, and better staffed.

But to get a better understanding we need to go beyond averages. The objective of this section is to relate facility characteristics to performance outcomes and test these relationships through regression analysis. This approach can not only identify facility level explanations of performance but can also quantify the marginal impact of variations of facility inputs on performance outcomes.

The findings for schools indicate that while location and funding is important, good performance is strongly associated with indicators of the quality of management and level of management effort at the school level. These characteristics are in turn dependent on the extent of formal oversight by Standards Officers and informal oversight by the school community. The main finding for health clinics is that revenue from user fees and support from health funding providers are key inputs to achieving good performance outcomes across a range of measures. The result highlights the importance of good financial management at health clinics, in particular collecting and managing user fees, an ability to source financing and support from funding providers, and a desire to use these resources to undertake key activities at the clinic.

8.2 Methodology

Regression analysis involves identifying variables of interest that are outputs or outcomes (dependent variables) and relating each of these measures to a set of explanatory variables. In a linear regression, the dependent variable is linearly related to the explanatory variables and a residual.¹⁶ Linear regression analysis or Ordinary Least Squares (OLS) will estimate a coefficient on each of the explanatory variables

16. The residuals measures the difference between an observation of the dependent variable and the model's predicted value for that observation based on the estimated linear equation over the explanatory variables.

specified in the regression in order to minimise the sum of the squared residuals.

Under specific conditions, the regression estimates are unbiased and the analysis allows for estimation of a causal relationship between explanatory variables and the dependent variable. In the case of linear regressions, the coefficient on an explanatory variable measures the estimated impact of a unit increase in that explanatory variable on the dependent variable (measured in units of the dependent variable). For example, the dependent variable could be the percentage of classrooms constructed of permanent materials (the performance measure) and one of the explanatory variables could be the number of hours travel from the school to the nearest trade store; under unbiased estimation the coefficient on this explanatory variable measures the estimated percentage point change in the share of classrooms made of permanent materials resulting from an additional hour's travel time to the nearest trade store.

An explanatory variable is typically identified as an important determinant of the dependent variable when its estimated coefficient is assessed to be statistically different from zero; for this to occur the estimated coefficient needs to be large relative to its standard error, a measure of how well the model estimates the coefficient's unknown value.

In practice, the extent to which conditions hold for unbiased estimation vary substantially. Care needs to be taken to interpret the results from regression analysis, particularly when there is potential for reverse causality, that is, when the explanatory variables are influenced by the dependent variable. When explanatory variables are endogenously determined (such as when reverse causality occurs) the estimated coefficients will be biased and will not reflect a true causal relationship running from the explanatory variable to the dependent variable. When reverse causality is thought to occur the regression results are best interpreted as identifying correlates between variables rather than a causal relationship. Nonetheless, identifying correlations between variable of interest is a useful first-step in the process for identifying causal relationships. The approach for selecting explanatory variables in this section is based on a priori reasoning which reduces the potential for reverse causation.

For reasons of simplicity and ease of interpretation of results, all regressions in this section are estimated linearly.¹⁷ For both school and health clinic regressions, the regression equations are estimated in levels, that is, the level of the dependent variable is regressed against measures of the level of explanatory variables. A potential issue with estimation in levels is that it is difficult to include all important explanatory variables in the regression equation. The problem of

17. Non-linear regression methods such as probit or logit regressions for binomial dependent variables are able to produce more precise model estimates but are not used here because the results are harder to interpret, particularly in the case of panel regressions.

omitted variable bias occurs when important explanatory variables are omitted from the regression equation which are correlated with other explanatory variables; in this case the estimates on the correlated variables will be over or under estimated in order to compensate for the omitted variable.

For health clinics, insufficient data was collected in 2002 for the purpose of regression analysis, and we only report results using the 2012 PEPE data. For schools, however, enough similar data was collected in both 2002 and 2012 to allow us to use both surveys. We do this in two ways. First, we simply pool the 2002 and 2012 data. Second, we report results from regressions in first-differences (that is, in terms of the change in variables over time). Estimation in first-differences is numerically equivalent to fixed-effects estimation in the case of two time periods. This is useful because in many cases omitted variables are specific characteristics of the unit of observation (in this case schools or health facilities) which do not change over time. Fixed-effect estimation on panel data eliminates their impact. On the other hand, fixed-effect estimates are less likely to tell us whether factors that are time invariant influence performance, such as whether the school or health clinic is church- or government-run.

The regressions are unweighted. Instead, control variables, such as facility type, agency and location, are used as explanatory variables in the regressions to account for the characteristics of the sample. While a number of explanatory variables are specified in each regression, the regression results presented in tables in this chapter contain only those variables with estimates that are statistically significant.

8.3 Performance measures

The dependent variables for schools and health facilities relate to facility level measures of the condition and provision of infrastructure, the provision of resources and equipment, management performance, and quality and quantity of outputs.

Education

The dependent variables (performance outcomes) used in the school regressions and their summary statistics are presented in Table 8-1; the levels of the dependent variables are shown for 2012 and 2002/2001 (some variables in the PESD survey are 2002 measures based on when the survey was undertaken and others are based on 2001 full year measures), and the change in the dependent variables within schools across the two time periods are shown the columns under the Change heading. The number of observations for the change in the dependent variables differs from the number of observations of the variables measured in levels due to missing observations and some schools not matching across the two time periods. Variables with (0/1) in the table are binomial and take a value of either zero or one (for

example, a value of 1 for DRINK WATER ALL YEAR indicates that drinking water was available at the school for the entire year and a value of zero indicates that drinking water was not available for the entire year).

Table 8-1: Summary statistics of dependent variables for school regressions

	2012			2002/2001			Change		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
Infrastructure variables									
PERMANENT CLASSROOMS (%)	216	73.0	32.7	198	63.4	38.1	162	7.8*	37.0
GOOD CLASSROOMS (%)	216	26.7	30.7	198	29.2	34.5	162	-4.4	41.3
PERMANENT TEACHER HOUSES (%)	216	57.6	37.3	206	48.4	41.6	153	8.8*	31.3
GOOD TEACHER HOUSES (%)	216	20.8	28.0	205	18.1	26.9	152	2.5	37.6
CLASSROOMS THAT DON'T LEAK (%)	216	65.2	27.8	197	62.4	33.9	161	1.0	42.2
DRINK WATER ALL YEAR (0/1)	214	72.4	44.8	190	58.3	49.2	154	10.3*	64.6
ENOUGH TOILETS (0/1)	214	55.1	49.9	181	52.9	50.1	151	9.4*	70.2
INFRASTRUCTURE INDEX (%)	216	59.7	21.0	199	53.8	18.0	163	5.2*	23.6
Resources variables									
SUFFICIENT TEXTBOOKS (0/1)	203	31.1	43.5	175	24.1	43.5	146	0.0	64.6
PRODUCE TEACHING AIDS (0/1)	203	77.8	40.4	175	79.2	40.4	146	-1.2	56.2
TEACHERS WORKING TO TEACHING POSITIONS (%)	214	90.4	34.0	197	79.5	23.7	163	5.7*	37.5
Management variables									
BOM EFFECTIVE (0/1)	196	67.3	47.1	196	76.5	42.8	139	-6.6	61.0
TEACHERS ON TIME (0/1)	212	59.4	49.2	203	69.4	46.3	160	-5.4	63.8
TEACHERS SPEND TIME TEACHING (0/1)	211	65.1	47.8	204	69.2	46.2	160	-1.2	62.1
Output variables									
STUDENTS PRESENT (%)	201	70.8	31.9	175	84.0	17.4	136	-15.5*	35.7
CHILDREN ATTEND SCHOOL (0/1)	212	70.0	45.9	204	62.3	48.4	162	11.9*	65.3

Notes: * indicates the value is significantly different from zero at the 10% level (only applied to the mean change). Variables with (0/1) refer to binomial variables that take a value of zero or one (means are reported in per cent). All data are weighted (the data in the Change columns are based on 2012 weights). GOOD CLASSROOMS and GOOD TEACHERS HOUSES are classrooms and houses that do not need rebuilding or maintenance, respectively. STUDENTS PRESENT is measured as the share of students in the Grade 5 teacher's home class present at the time of the survey out of total students in the home class. CHILDREN ATTEND SCHOOL equals one if the Grade 5 teacher reports that most or all children of school age in the community attend school, and zero otherwise.

The share of classrooms (PERMANENT CLASSROOMS) and teachers' houses (PERMANENT TEACHER HOUSES) made of permanent materials both increased over the two periods, an average change of around 8 and 9 per cent, respectively. These mean changes along with the average change in DRINK WATER ALL YEAR, ENOUGH TOILETS and INFRASTRUCTURE INDEX were all statistically different from zero. ENOUGH TOILETS takes a value of one when the Head Teacher reports that there are sufficient toilets for males and females at the school. The variable INFRASTRUCTURE INDEX takes a value between zero and one and is the simple average of seven binomial measures of infrastructure provision (provision of a library, staffroom, administration block, sports area, sports equipment, school vehicle, and school agricultural area). The mean change in all of the other infrastructure related variables were not statistically different from zero. GOOD CLASSROOMS and GOOD TEACHER HOUSES are

variables that measure the share of classrooms and houses that do not need to be rebuilt or require significant maintenance work. CLASSROOMS THAT DON'T LEAK measures the share of classrooms that don't leak when it rains.

SUFFICIENT TEXTBOOKS and PRODUCE TEACHING AIDS equal one when a Grade 5 teacher reports that there were sufficient textbooks at the school for Grade 5 students and an ability to produce teaching aids for the classroom, respectively. TEACHERS WORKING TO TEACHING POSITIONS measures the ratio of the number of teachers regularly working to the number of teaching positions at the school and captures the ability of the school to fill teaching positions. Only the mean change in TEACHERS WORKING TO TEACHING POSITIONS (an increase of nearly six percentage points) was statistically different from zero among the school resources performance measures.

The measures on school management outcomes were based on P&C representative/parent perceptions; the mean change for all of these variables was not significantly different from zero. BOM EFFECTIVE, TEACHERS ON TIME and TEACHERS SPEND TIME TEACHING take a value of one when parents rate BoM management as effective, teachers are often or always on time, and when teachers often or always spend time at school teaching, respectively. The change in each of these variables was not statistically different from zero between the two periods.

The measures of school output were limited to STUDENTS PRESENT, measured as the number of students in the Grade 5 teacher's home-class present at the time of the survey divided by total enrolled students in the home-class, and CHILDREN ATTEND SCHOOL which takes a value of 1 if P&C representatives / parents reported that most or all children of school age in the community attended school. There was a significant decrease in STUDENTS PRESENT over the decade; the increase in the number of students present at schools was not able to keep pace with the increase in enrolments at schools. In contrast, there was a significant increase in CHILDREN ATTEND SCHOOL which indicates improvement in access to schooling in communities, despite attendance not being as high as it could be due to the decrease in STUDENTS PRESENT.¹⁸

Health

As noted above, the regression analysis for health clinics is based on 2012 data from the PEPE survey only due to the limited range of variables measured in the PESD survey. For this reason all the regressions are specified in levels. Summary statistics of dependent (or

18. Neither the PEPE nor PESD surveys collected data on the number of children of school age across school catchment areas which meant that enrolment rates could not be used in the regression analysis.

performance) variables for health clinic regressions are presented in Table 8-2.

Similar to the school measures, the infrastructure variables measure the condition, construction, and provision of health clinic fixed assets. The variable CLINIC INFRASTRUCTURE INDEX is calculated as the simple average of four binomial measures of good or adequate provision of infrastructure at facilities (health clinic vehicle, kitchen, beds and mattresses, and patient waiting room).

Table 8-2: Summary statistics of dependent variables for health clinic regressions

Dependent variables	N	Mean	SD
Infrastructure variables			
GOOD CLINIC ROOMS (%)	136	27.8	37.0
PERMANENT WORKER HOUSES (%)	110	74.8	38.1
GOOD WORKER HOUSES (%)	108	25.1	38.8
CLINIC ROOMS THAT DON'T LEAK (%)	138	68.1	37.5
ENOUGH TOILETS (0/1)	137	51.2	50.2
CLINIC INFRASTRUCTURE INDEX (%)	142	25.8	31.5
Resources variables			
WATER ACCESS (0/1)	139	50.4	50.4
REFRIGERATION (0/1)	139	41.4	49.9
FUEL AVAILABLE (0/1)	139	63.8	48.3
ZERO DOCTOR VISITS (0/1)	142	88.5	32.6
WORKERS TO CLINIC POSITIONS	137	80.9	25.2
DRUG AVAILABILITY INDEX	142	60.4	20.6
Management variables			
WORKERS AT CLINIC (0/1)	137	73.5	44.4
STAFFING PROBLEMS (0/1)	139	29.5	45.8
PATIENTS SEEN ON ARRIVAL (0/1)	138	88.5	32.0
FUNDING PROBLEMS (0/1)	139	39.3	49.1
Output variables			
HEALTH PATROLS	136	9.3	29.4
HEALTH PATROLS GREATER THAN 10 (0/1)	142	11.5	32.0
COMMUNITY HEALTH PROMOTION (0/1)	137	72.2	45.2
MEETS COMMUNITY NEEDS (0/1)	137	75.9	43.6
TRANSFER PATIENTS (0/1)	142	81.8	38.8
SERVICE QUALITY PROBLEMS (0/1)	139	39.6	49.5

Notes: Weighted data for 2012. Variables with (0/1) refer to binomial variables that take a value of zero or one (means are reported in per cent). GOOD CLINIC ROOMS and GOOD WORKER HOUSES are buildings that do not need rebuilding or maintenance.

The DRUG INDEX variable within the resources category is calculated as the simple average over 16 binomial variables that measure the

availability of important drugs and medical supplies.¹⁹ WATER ACCESS, FUEL AVAILABLE, REFRIGERATION and ZERO DOCTOR VISITS are all binomial variables that take a value of one when there was water access on the day of the survey, the OIC reported having fuel for transport most or all of the time, the clinic has refrigeration facilities for drug storage, and a doctor did not visit the clinic in 2012, respectively. The variable WORKERS TO CLINIC POSITIONS is measured as the ratio of the number of workers who regularly turn up at the clinic to the number of designated worker positions at the clinic.

Management-related performance measures include whether workers were at the clinic often or all of the time (WORKERS AT CLINIC), and whether a user of the clinic reported that they were seen on arrival to the clinic (PATIENTS SEEN ON ARRIVAL), or there were staffing issues (STAFFING PROBLEMS) or problems with funding at the clinic (FUNDING PROBLEMS).

The output-related variables measure a range of key activities at health facilities: health patrols, health promotion in the community (COMMUNITY HEALTH PROMOTION), and an ability to transfer patients to receive specific health care (TRANSFER PATIENTS). Health patrol variables measure the number of patrols in 2012 (NUMBER OF HEALTH PATROLS) and whether the clinic conducted more than 10 health patrols in 2012 (HEALTH PATROLS GREATER THAN 10), the latter an important indicator of whether the clinic is able to provide regular health care and immunisations to the surrounding community. Two other output measures are based on user perceptions of the clinic: whether the clinic meets the health care needs of the community (MEETS COMMUNITY NEEDS) and whether there are service quality problems at the clinic (SERVICE QUALITY PROBLEMS). A difficulty that precluded the analysis of the number of patients or patients per worker was the inability to control for the catchment size and prevalence of health problems in local communities, as well as the heterogeneity of treatment types across facilities.

8.4 Explanatory variables

The explanatory variables for school and health clinic regressions are broadly categorised by clinic type and location, management characteristics, supervision characteristics, measures of community interaction, and measures of clinic resources. A number of the explanatory variables are binomial dummy variables (either taking a value of zero or one), such as whether school agency is GOVERNMENT (0/1), CHURCH (0/1), or PRIVATE (0/1). In general a regression cannot include all of these dummy variables due to perfect multicollinearity; one of the dummies must be left out (except when the regression is specified without a constant term) and the estimated coefficients on

19. These are Panadol, fansidar, TB blister packs, condoms, liniment, depo-provera, measles vaccine, ergometrine, oral rehydration solution, oxygen, amoxicillin tablets, chloroquine, baby books, pregnancy tests, malaria – rapid diagnostic testing, and mala-wan.

the dummies included in the regression are interpreted as values relative to the coefficient on the dummy variable omitted from the regression.

Education

Summary statistics of explanatory variables for school regressions are presented in Table 8-3. The data indicate that there was a significant increase in schools upgrading from community to primary school status over time. Slightly less than 60 per cent of schools in the PEPE and PESD samples are government, with the remainder mostly consisting of church run schools. The REMOTENESS INDEX variable is measured in hours and is calculated as the simple average over the travel time from each school to the nearest health clinic, police station, trade store, commercial bank and provincial capital as reported by the Head Teacher. The increase in REMOTENESS INDEX over time is significantly different from zero and in large part reflects the loss of banking services in Gulf Province and the closure of the airstrip in Pomio District.

None of the mean changes in Head Teacher specific variables were significantly different from zero. For the Board of Management (BoM) variables, the average change in the share of parents on the BoM increased but the share of female representatives on the BoM decreased. The variables BOM MOST SAY - CLASSROOMS and BOM MOST SAY - MAINTENANCE take a value of one if the Head Teacher of the school reported that the BoM had the most say in making decisions on building classrooms and undertaking school maintenance activities, respectively, and zero otherwise. There was a significant decrease in BOM MOST SAY – MAINTENANCE over the two periods and the change in number of BoM meetings (BOM MEETINGS) and BOM MOST SAY – CLASSROOMS were not significantly different from zero.

While the average change in the number of Standards Officer (SO) visits to schools (SO VISITS) was not significant, Head Teachers on average reported a significant decline in SO visits that did not result in a written report provided by the SO to the school during or following a visit (SO NO REPORT). There was also a significant increase in SO visits in which the SO observed classes (SO OBSERVED CLASSES) and checked school records (SO CHECKED SCHOOL RECORDS).

Table 8-3: Summary statistics of explanatory variables for school regressions

	2012			2002/2001			Change		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
Type and location									
COMMUNITY SCHOOL (0/1)	216	12.5	33	206	63.5	49.2	167	-44.5*	51.7
CHURCH (0/1)	216	38.4	49	201	43.8	51.0	167	-6.5*	40.5
PRIVATE (0/1)	216	3.2	17	201	1.7	13.3	167	-0.1	16.7
RE MOTENESS INDEX (HOURS)	214	3.5	6	185	3.0	4.1	151	0.7*	3.8
Head Teacher									
FEMALE HT (0/1)	215	17.9	39	199	12.8	33.6	164	4.0	52.6
NUMBER OF YEARS HT	216	3.1	3	171	2.9	2.9	138	0.1	4.7
BORN IN PROVINCE HT (0/1)	216	69.9	46	198	71.6	45.7	163	1.1	63.6
BOM									
BOM MEETINGS	213	4.0	2	179	4.0	2.2	140	0.2	3.5
BOM PARENT (%)	215	38.2	24	199	31.9	22.4	163	6.1*	29.1
BOM FEMALE (%)	215	22.0	17	199	22.8	14.2	163	-3.0*	21.0
BOM MOST SAY - CLASSROOMS (0/1)	214	64.4	44	198	74.6	43.7	161	-7.1	61.3
BOM MOST SAY - MAINTENANCE (0/1)	215	68.5	47	198	75.0	43.4	162	-9.2*	64.7
Standards Officer									
SO VISITS	216	1.2	1	179	1.3	1.4	146	-0.1	1.8
SO NO REPORT (0/1)	216	20.2	40	171	35.3	48.0	143	-19.3*	59.2
SO OBSERVED CLASSES (0/1)	201	62.2	49	174	57.8	49.6	136	11.5*	70.6
SO CHECKED RECORDS (0/1)	201	68.2	47	168	56.0	49.8	133	20.9*	63.2
Community interaction									
P&C MEETINGS	199	3.9	5	189	3.7	5.4	126	0.3	6.2
HT MIXES WITH COMMUNITY (0/1)	207	48.5	50	197	45.5	50.0	152	9.0	72.5
SCHOOL INVITES COMMUNITY (0/1)	205	83.6	37	199	51.6	50.1	152	32.9*	56.2
Resources									
REVENUE PER STUDENT	183	307.6	172	89	163.6	132.6	69	153.2*	153.9
LOWER SCHOOL FEE	216	7.7	22	189	24.2	36.5	157	-20.5*	41.7
LOWER PROJECT FEE	198	23.7	33	193	36.6	38.3	145	-13.3*	45.4

Notes: * indicates the value is significantly different from zero at the 10% level (only applied to the mean change). Variables with (0/1) refer to binomial variables that take a value of zero or one (mean and standard deviation are reported in per cent). All data are weighted (the data in the Change columns are based on 2012 weights).

The average change in the number of P&C meetings at schools (P&C MEETINGS) was not significantly different from zero. Similarly, there was no significant change in the prevalence of the Head Teacher often mixing with the community (HT MIXES WITH COMMUNITY) as reported by the P&C/parents. However, there was a 32 percentage point improvement (significantly different from zero) in the prevalence of schools inviting the community to participate in preparing programs at the school (SCHOOL INVITES COMMUNITY). For school resources variables, revenue per student increased by around K128 in real terms, despite an average real reduction in school fees (charged to lower primary students) of around K19 and an average real reduction in project fees (charged to lower primary students) of around K8.²⁰

20. Lower primary school and project fees are used here due to the high proportion of community schools in the 2002 PESD survey, which did not have grades in the upper primary school level.

Instead, real funding increases to schools were driven by increased school subsidy payments from the national government.

All of the level regressions include dummy variables for each province (no constant term is estimated in the regressions).

Health

Summary statistics of explanatory variables for health clinic regressions are presented in Table 8-4. Health clinic types are broken down into two categories: aid post and health centre plus (40 and 60 per cent of observations, respectively). The latter category consists of health centres, sub-health centres, district health centres, rural hospitals, and urban clinics. Church, private and government clinics represent 37, 6, and 57 per cent of observations in the sample, respectively.

The variable CLINIC REMOTENESS INDEX is calculated as the simple average of six measures of travel time in hours from the health clinic to various infrastructure and service access points (the provincial capital, an operating road that can be accessed by 4x4 vehicles, the nearest bank, the nearest trade store, the nearest commercial source of drugs, and the nearest referral health centre or hospital). The variable CLINIC SIZE is a control variable for the size of the clinic and is measured by the number of patients treated at the clinic in a typical day.

The management related variables capture basic characteristics of the OIC (FEMALE OIC, NUMBER OF YEARS OIC and BORN IN DISTRICT OIC). The variables prefixed by USER FEES and OWN BUDGET equal one when the clinic normally meets expenses for various common activities through user fees revenue and the clinic budget, respectively. These variables equal zero when the activities are funded by other means such as requests to other institutions (district administration, provincial administration, church, and private companies) or health workers, or when the activities are not provided by the health clinic. USER FEES and OWN BUDGET are categorised as management variables as they capture whether the clinic chooses to use discretionary funds to pay for drugs, fuel, and patient transfers.

The resources related variables include USER FEES RAISED, which is the amount of user fees revenue collected at the clinic in a typical month, and the variable PATIENTS PAY FOR VISITS, which takes a value of one when patients pay for any kind of visitation to the clinic. FUNDING SUPPORT equals one when the clinic received funding from any source at all in 2012 other than through user fees. IN-KIND SUPPORT equals one when the clinic received any support in the form of supplies or materials from funding providers or health programs in 2012.

The supervision and community interaction variables include CLINIC SUPERVISOR, which equals one when the clinic has a supervisor (the person the OIC reports to or has responsibility over the clinic),

VILLAGE HEALTH COMMITTEE, which equals one when the clinic is supported by a Village Health Committee (VHC), and COMMUNITY ASSISTANCE, which equals one when community members volunteer to assist the clinic.

Table 8-4: Summary statistics of explanatory variables for health clinic regressions

Explanatory variables	N	Mean	SD
Type and location			
AID POST (0/1)	142	46.5	50.5
CHURCH (0/1)	142	37.4	48.6
PRIVATE (0/1)	142	5.9	23.9
CLINIC REMOTENESS INDEX (hours)	142	3.1	3.3
CLINIC SIZE (patient visits per day)	142	35.2	33.2
Management			
FEMALE OIC (0/1)	142	34.8	48.4
NUMBER OF YEARS OIC	142	8.9	8.8
BORN IN DISTRICT OIC (0/1)	142	49.5	50.2
USER FEES - FUND DRUGS (0/1)	142	28.7	45.7
OWN BUDGET - FUND DRUGS (0/1)	142	11.9	32.5
USER FEES - FUND FUEL (0/1)	142	26.7	44.6
OWN BUDGET - FUND FUEL (0/1)	142	11.7	32.3
USER FEES - FUND TRANSFER (0/1)	142	20.8	40.8
OWN BUDGET - FUND TRANSFER (0/1)	142	28.0	45.1
Resources			
USER FEES RAISED (K100 PER MONTH)	125	483.9	823.9
PATIENTS PAY FOR VISITS (0/1)	140	83.4	37.5
FUNDING SUPPORT (0/1)	130	25.0	43.5
IN-KIND SUPPORT (0/1)	142	34.2	47.6
ELECTRICITY (0/1)	142	40.5	49.4
Supervision and community			
CLINIC SUPERVISOR (0/1)	141	63.6	48.5
VILLAGE HEALTH COMMITTEE (0/1)	142	64.4	48.4
COMMUNITY ASSISTANCE (0/1)	139	58.1	49.5

Notes: Weighted data for 2012. Variables with (0/1) refer to binomial variables that take a value of zero or one (means are reported in per cent). USER FEES and OWN BUDGET are variables that equal one when drugs, fuel or patient transfer costs are funded via user fees and the clinic budget, respectively, and zero otherwise.

In addition to these explanatory variables, regressions also include three dummy variables on health clinic user characteristics when the dependent variable is based on the perceptions of clinic users. These dummy variables control for whether the user has official ties to the clinic, has official responsibilities at the clinic, or the user is a relative of a clinic worker. All regressions include dummy variables for each province (no constant term is estimated in the regressions).

8.5 Facility level findings in education

Regression findings for school infrastructure

The results for level regressions on school infrastructure-related dependent variables are presented in Tables 8-5 and 8-6. For example, upgrading school status from a community to a primary school is estimated to increase the share of permanent classrooms and teachers' houses by 17 and 24 percentage points respectively, as well as increase the share of good teachers' houses by 7 percentage points and the school infrastructure index by 11 percentage points.

Table 8-5: Regression results for school infrastructure regressions (in levels)

Variable (level measure)	PERMANENT CLASSROOMS (%)	GOOD CLASSROOMS (%)	PERMANENT TEACHER HOUSES (%)	GOOD TEACHER HOUSES (%)	CLASSROOMS THAT DON'T LEAK (%)
COMMUNITY SCHOOL (0/1)	-16.60 (6.02)***		-24.09 (5.83)***	-7.46 (4.48)*	
CHURCH (0/1)	-8.19 (4.02)**		-12.22 (4.20)***		
RE MOTENESS INDEX (HOURS)	-1.28 (0.40)***		-1.36 (0.49)***		
BOM MEETINGS	1.50 (0.70)**				
BOM PARENT (%)		22.48 (12.81)**			
BOM MOST SAY - CLASSROOMS (0/1)		12.30 (5.35)**			
SO VISITS					2.67 (1.38)*
SO NO REPORT (0/1)	-10.15 (5.08)**			-8.77 (4.48)*	
SO OBSERVED CLASSES (0/1)					8.23 (4.57)*
REVENUE PER STUDENT (per K100)	3.51 (1.42)**		2.43 (1.40)*		
Province dummies	YES	YES	YES	YES	YES
R ²	0.89	0.53	0.82	0.43	0.85
N	231	229	255	212	203

Notes: Linear regression results based on pooled 2001/2002 and 2012 data. Only variables with coefficients significantly different from zero at the 10% level are presented. Heteroskedastic consistent standard errors in parentheses; ***, **, and * indicates variable is significantly different from zero at the 1%, 5% and 10 % level, respectively.

The estimates on REMOTENESS INDEX highlight the impact of greater remoteness on the share of classrooms and teachers' houses made of permanent materials (an extra index hour is estimated to reduce the share by 1.3 and 1.4 percentage points respectively), and on the infrastructure index (a reduction of nearly one percentage point per hour). In separate regressions results (not presented here), the main driver of this effect is the number of hours it takes to travel from the school to the nearest bank.

An important finding is that additional revenue per student is important for building better constructed infrastructure and obtaining better provision of general infrastructure but not for ensuring that infrastructure is kept in good condition. The key factors that impact on the condition of infrastructure relate to characteristics of the BOM, and the extent of SO oversight. Another interesting finding is that the probability of church schools having enough toilets is 19 percentage points higher compared to government schools, but church schools have 8 and 12 percentage point lower share of permanent classrooms and teachers' houses, respectively, controlling for other school characteristics.

Table 8-6: Additional regression results for school infrastructure regressions

Variable (level measure)	DRINK WATER ALL YEAR (0/1)	ENOUGH TOILETS (0/1)	INFRASTRUCTURE INDEX (%)
COMMUNITY SCHOOL (0/1)	25.00 (8.18)***		-10.60 (3.27)***
CHURCH (0/1)		19.12 (6.80)***	
REMOTENESS INDEX (HOURS)			-0.91 (0.19)***
BORN IN PROVINCE HT (0/1)		-17.11 (7.12)**	
BOM MEETINGS		2.22 (1.26)*	
BOM MOST SAY - CLASSROOMS (0/1)		20.31 (6.67)***	
SO CHECKED RECORDS (0/1)	14.10 (7.58)*	16.97 (7.59)**	8.47 (2.51)***
P&C MEETINGS		0.92 (0.40)**	
SCHOOL INVITES COMMUNITY (0/1)	15.59 (8.42)*		
REVENUE PER STUDENT (per K100)			1.38 (0.83)*
2002/2001 Survey	-21.16 (8.48)***		
Province dummies	YES	YES	YES
R ²	0.77	0.65	0.93
N	208	208	222

Notes: Linear regression results based on pooled 2001/2002 and 2012 data. Only variables with coefficients significantly different from zero at the 10% level are presented. Heteroskedastic consistent standard errors in parentheses; ***, **, and * indicates variable is significantly different from zero at the 1%, 5% and 10 % level, respectively.

The results for regressions in first-differences (i.e. panel regressions) indicate that a much smaller set of explanatory variables are significant determinants of infrastructure-related performance

outcomes relative to the regressions specified in levels. In part this result reflects the elimination of time-invariant variables from the set of explanatory variables due to first-differencing; explanatory variables that show little variation in magnitude over time are also not likely to have regression coefficients that are significantly different from zero. The ability to control for unobserved time-invariant variables greatly improves the reliability of the results, but reduces their explanatory power.

The results indicate that additional management effort by the BoM as well as BoMs that have the most say in decision making on building classrooms lead to significant improvements in school infrastructure. For example, an additional BoM meeting is estimated to increase the share of permanent classrooms and teachers' houses by 3.8 and 2.8 percentage points, respectively, as well as increase the probability of enough toilets by 3.8 percentage points. A move towards the BoM having the most say in decision making on building classrooms is estimated to increase the share of permanent classrooms 11 percentage points and increase the share of good teachers' houses by 15 percentage points. In addition, a 10 percentage point increase in the share of females on the BoM is estimated to increase the infrastructure index by 2 percentage points.

Table 8-7: Regression results for school infrastructure (in first-differences)

Variable (Change measure)	PERMANENT CLASSROOMS (%)	GOOD CLASSROOMS (%)	PERMANENT TEACHER HOUSES (%)	GOOD TEACHER HOUSES (%)	ENOUGH TOILETS (0/1)	INFRASTRUCTURE INDEX (%)
BORN IN PROVINCE HT (0/1)		17.53 (9.85)*				
BOM MEETINGS	3.83 (0.81)***		2.77 (1.20)**		3.75 (1.70)**	
BOM FEMALE (%)						20.86 (8.51)**
BOM MOST SAY - CLASSROOMS (0/1)	11.29 (6.04)**			15.43 (6.30)**		
SO CHECKED RECORDS (0/1)						6.75 (3.22)**
P&C MEETINGS			0.63 (0.34)*			0.55 (0.22)**
HT MIXES WITH COMMUNITY (0/1)		21.59 (7.81)***		14.17 (5.96)***		
REMOTENESS INDEX (HOURS)						-0.85 (0.36)**
CONSTANT	10.71 (4.33)**		6.19 (2.82)***			4.37 (2.08)**
R ²	0.20	0.21	0.19	0.14	0.05	0.19
N	67	59	58	58	108	95

Notes: Linear regression results based on first-differenced 2001/2002 and 2012 data. Only variables with coefficients significantly different from zero at the 10% level are presented. Heteroskedastic consistent standard errors in parentheses; ***, **, and * indicates variable is significantly different from zero at the 1%, 5% and 10 % level, respectively.

The infrastructure index is estimated to be 7 percentage points higher when the SO checks school records. Changes in community related

variables are also important with the share of good classrooms and teachers' houses estimated at 22 and 14 percentage points higher, respectively, when the Head Teacher mixes with the community. Also, an additional P&C meeting is estimated to increase the share of permanent teachers' houses and infrastructure index by 0.6 percentage points.

Regression findings for school resources

The regression results for school resources indicate the important role of school oversight by SOs and the community in driving better performance. The level regressions (see Table 8-8) indicate that when the SO checks school records the probability of Grade 5 teachers reporting sufficient textbooks and an ability to produce teaching aids in class increases by 13 and 17 percentage points, respectively. Schools that invite community members to help with programs are estimated to experience a near 17 percentage point increase in the probability of sufficient textbooks at schools. Schools with a head teacher born in the province are estimated to perform relatively worse in terms of sufficient textbooks and teachers being able to produce teaching aids.

The share of teachers working to teaching positions at schools is estimated to be 12 percentage points higher when the SO checked school records. While the estimates indicate that additional P&C meetings significantly reduce the ratio of teachers regularly working to teachers positions at the school, it is possible that this result is driven by reverse causality; a low ratio at schools may give rise to additional P&C meetings that attempt to address the problem of fewer teachers at the school than expected. Church schools are also estimated to have a lower share of teaching positions filled relative to government schools, controlling for a range of variables.

The regressions in first-differences did not produce statistically significant results.

Table 8-8: Results for school resources regressions (in levels)

Variable (level measure)	SUFFICIENT TEXTBOOKS (0/1)	PRODUCE TEACHING AIDS (0/1)	TEACHERS WORKING TO TEACHING POSITIONS (%)
CHURCH (0/1)			-8.62 (4.82)*
BORN IN PROVINCE HT (0/1)	-16.47 (7.46)**	-11.33 (5.87)*	
SO CHECKED RECORDS (0/1)	13.21 (5.95)**	17.18 (6.17)***	12.12 (5.50)**
P&C MEETINGS			-0.47 (0.23)**
SCHOOL INVITES COMMUNITY (0/1)	16.55 (7.24)**		
2002/2001 Survey			
Province dummies	YES	YES	YES
R ²	0.35	0.84	0.90
N	197	202	221

Notes: Linear regression results based on pooled 2001/2002 and 2012 data. Only variables with coefficients significantly different from zero at the 10% level are presented. Heteroskedastic consistent standard errors in parentheses; ***, **, and * indicates variable is significantly different from zero at the 1%, 5% and 10 % level, respectively.

Regression findings for school management

The level regression results on school management related variables (Table 8-9) indicate that church schools perform better at managing teachers, both in terms of getting teachers to schools on time and ensuring they spend their time teaching. Community interaction variables are also important in driving effective management of the school by the BoM and in teacher management.

Table 8-9: Results for school management regressions (in levels)

Variable (level measure)	BOM EFFECTIVE (0/1)	TEACHERS ON TIME (0/1)	TEACHERS SPEND TIME TEACHING (0/1)
CHURCH (0/1)		12.64 (6.15)**	13.73 (5.82)**
REMOTENESS INDEX (HOURS)		0.99 (0.43)**	
SO CHECKED RECORDS (0/1)	13.77 (6.65)**		
HT MIXES WITH COMMUNITY (0/1)		20.48 (6.17)***	13.61 (6.28)**
SCHOOL INVITES COMMUNITY (0/1)	28.03 (8.35)***		
2002/2001 survey	14.97 (7.93)*		
Province dummies	YES	YES	YES
R ²	0.79	0.70	0.74
N	199	230	230

Notes: Linear regression results based on pooled 2001/2002 and 2012 data. Only variables with coefficients significantly different from zero at the 10% level are presented. Heteroskedastic consistent standard errors in parentheses; ***, **, and * indicates variable is significantly different from zero at the 1%, 5% and 10 % level, respectively.

The results for regressions specified in first-differences support the finding that community interaction variables are important for BoM effectiveness as well as teachers management. However, the results also indicate that the probability of BoM effectiveness declines the longer the Head Teacher has been at the school. An increase in real revenue per student is also important in raising the probability that teachers are on time at school.

Table 8-10: Results for school management regressions (in first-differences)

Variable (Change measure)	BOM EFFECTIVE (0/1)	TEACHERS ON TIME (0/1)	TEACHERS SPEND TIME TEACHING (0/1)
NUMBER OF YEARS HT	-1.76 (0.92)*		
HT MIXES WITH COMMUNITY (0/1)		36.61 (12.86)***	16.74 (7.41)**
SCHOOL INVITES COMMUNITY (0/1)	38.44 (9.90)***		
REMOTENESS INDEX (HOURS)		1.11 (0.46)**	
Constant	-18.63 (6.54)***		
R ²	0.18	0.21	0.06
N	92	53	125

Notes: Linear regression results based on first-differenced 2001/2002 and 2012 data. Only variables with coefficients significantly different from zero at the 10% level are presented. Heteroskedastic consistent standard errors in parentheses; ***, **, and * indicates variable is significantly different from zero at the 1%, 5% and 10 % level, respectively.

Regression findings for school outputs

The results for level regressions on school outputs are presented in Table 8-11. The level and first-difference regressions for school output variables were also specified with school performance measures as explanatory variables, such as PRODUCE TEACHING AIDS, TEACHERS SPEND TIME TEACHING and PERMANENT CLASSROOMS. This approach allows for the identification of direct determinants of school outputs, noting that these determinants will in turn be explained by other or common factors as shown in previous regression results in this chapter.

The estimates indicate that BoMs with a larger share of parents produce better outcomes in terms of getting enrolled students to be present at school (a 10 percentage point increase in BOM PARENT is associated with a near 2 percentage point increase in STUDENTS PRESENT). The share of students present is also estimated to decline with remoteness and when the Head Teacher is female but increase with revenue per student. The estimated impact of the Grade 5 teacher being able to produce teaching aids in the classroom is to raise STUDENT PRESENT by 10 percentage points.

The probability of most or all children in the community attending school is estimated to increase by 1.2 and 2.5 percentage points for every additional year the Head Teacher has been at the school and for every SO visit received by the school, respectively. Schools where the P&C reported that teachers spend time teaching are estimated to have a 12.5 percentage point high probability of most or all children attending school.

Table 8-11: Results for school output regressions (in levels)

Variable (level measure)	STUDENTS PRESENT (%)	CHILDREN ATTEND SCHOOL (0/1)
REMOTENESS INDEX (HOURS)	-1.00 (0.38)***	
BOM PARENT (%)	18.00 (8.69)**	
FEMALE HT (0/1)	-10.03 (5.31)*	
NUMBER OF YEARS HT		1.24 (0.57)**
SO VISITS		3.07 (1.31)**
Revenue per student (K100)	2.35 (1.41)*	
PRODUCE TEACHING AIDS (0/1)	10.44 (4.75)**	
TEACHERS SPEND TIME TEACHING (0/1)		12.51 (5.87)**
2002/2001 survey	17.10 (4.98)***	-14.23 (5.93)**
Province dummies	YES	YES
R ²	0.90	0.72
N	216	318

Notes: Linear regression results based on pooled 2001/2002 and 2012 data. Only variables with coefficients significantly different from zero at the 10% level are presented. Heteroskedastic consistent standard errors in parentheses; ***, **, and * indicates variable is significantly different from zero at the 1%, 5% and 10 % level, respectively.

The first-difference regressions results (Table 8-12) also provide support for the positive relationship between the share of parents on the BoM and the share of students present at school: a 10 percentage point increase in BOM PARENT is associated with a 4 percentage point increase in STUDENTS PRESENT, controlling for other changes. However, a 10 percentage point increase in the share of parents on the BoM is estimated to reduce the probability of most or all children in the community attending school by 3 percentage points. The result indicates that the influence of parents on the BoM is to improve student attendance possibly at the expense of getting those children not in the school system to attend school.

The reduction in the lower primary school fee (LOWER SCHOOL FEE) has had a significant impact on increasing the probability that most or all children of school age attend school. Every K10 reduction in LOWER SCHOOL FEE is estimated to increase the probability of most or all children attending school by 2.8 percentage points, which is around an increase of 5.6 percentage points for the average school in the sample that reduced its lower primary school fee by K20.

A 10 percentage point increase in the share of permanent classrooms is estimated to increase STUDENTS PRESENT by 1.5 percentage points. Teachers that are able to produce teaching aids and who spend their time teaching are also estimated to positively impact on the probability that most or all children of school age attend school (16 and 23 percentage points, respectively).

Table 8-12: Results for school output regressions (in first-differences)

Variable (Change measure)	STUDENTS PRESENT (%)	CHILDREN ATTEND SCHOOL (0/1)
BOM PARENT (%)	39.25 (9.89)***	-32.46 (18.35)*
LOWER SCHOOL FEE		-0.28 (0.10)***
PERMANENT CLASSROOMS (%)	15.58 (6.88)**	
TEACHERS SPEND TIME TEACHING (0/1)		22.93 (9.59)**
PRODUCE TEACHING AIDS (0/1)		15.91 (7.35)**
CONSTANT	-18.11 (3.14)***	15.31 (6.44)**
R ²	0.13	0.21
N	121	109

Notes: Linear regression results based on first-differenced 2001/2002 and 2012 data. Only variables with coefficients significantly different from zero at the 10% level are presented. Heteroskedastic consistent standard errors in parentheses; ***, **, and * indicates variable is significantly different from zero at the 1%, 5% and 10 % level, respectively.

8.6 Facility-level findings in health

Regression findings for health clinic infrastructure outcomes

The regression results presented in Table 5-13 indicate that clinic type and location, OIC characteristics, the level of clinic resources, and supervision and community interaction variables are important determinants of the provision and condition of infrastructure at health clinics. Aid posts are more likely to have clinic rooms that leak and score much lower on the clinic infrastructure index. Similar to the finding for school infrastructure, remote clinics also perform worse in terms of clinic rooms that do not leak and the share of worker houses made of permanent materials (a reduction of 2.7 and 2.1 percentage points, respectively, for each additional CLINIC REMOTENESS INDEX hour). However, church and private clinics perform much better than government clinics in terms of the share of permanent worker houses.

There is a positive impact on the condition of clinic rooms when the OIC is from the local district but the infrastructure index is estimated to be lower by two-thirds of a percentage point for each additional year

the OIC respondent has been in the OIC position at the clinic. This negative impact on the infrastructure index is substantial given that the mean number of years the OIC has been in the position is about nine.

User fees are estimated to be an important determinant of infrastructure outcomes, as well as receiving in-kind support and greater interaction with the local community. An additional K100 raised per month is estimated to improve the share of good clinic rooms and good worker houses, as well as the infrastructure index, by over one percentage point for each. Clinics that receive support from a Village Health Committee (VHC) have clinic rooms that are 12 percentage points less likely to leak. Clinics that receive community assistance are estimated to achieve higher shares of good clinic rooms, permanent worker houses, good worker houses, and clinic rooms that don't leak by around 14 to 21 percentage points.

Table 8-13: Results for health clinic infrastructure regressions

	GOOD CLINIC ROOMS (%)	PERMANENT WORKER HOUSES (%)	GOOD WORKER HOUSES (%)	CLINIC ROOMS THAT DON'T LEAK (%)	ENOUGH TOILETS (0/1)	CLINIC INFRASTRUCTURE INDEX (%)
AID POST (0/1)				-18.65 (6.74)***		-24.00 (4.81)***
CHURCH (0/1)		15.08 (6.17)**				
PRIVATE (0/1)		39.98 (18.57)**				
CLINIC REMOTENESS INDEX (hours)		-2.73 (1.51)*		-2.10 (0.77)***		
NUMBER OF YEARS OIC						-0.67 (0.27)**
BORN IN DISTRICT OIC (0/1)				18.23 (5.92)***		
USER FEES RAISED (K100 PER MONTH)	1.05 (0.38)***		1.64 (0.34)***			1.06 (0.27)***
IN-KIND SUPPORT (0/1)		12.42 (6.85)*				
CLINIC SUPERVISOR (0/1)					18.69 (10.20)*	
VILLAGE HEALTH COMMITTEE (0/1)				11.56 (6.30)*		
COMMUNITY ASSISTANCE (0/1)	15.69 (7.88)**	13.83 (8.14)*	21.03 (8.18)**	18.70 (5.98)***		
Province dummies	YES	YES	YES	YES	YES	YES
R ²	0.56	0.86	0.43	0.89	0.51	0.69
N	119	92	91	114	111	116

Notes: Linear regression results based on 2012 data. Only variables with coefficients significantly different from zero at the 10% level are presented. Heteroskedastic consistent standard errors in parentheses; ***, **, and * indicates variable is significantly different from zero at the 1%, 5% and 10% level, respectively. GOOD CLINIC ROOMS and GOOD WORKER HOUSES are buildings that do not need rebuilding or maintenance.

Regression findings for health clinic resources outcomes

The results presented in Table 8-14 indicate that clinic type and location, management characteristics, user fee revenue and support from funding providers, and community support are important determinants of the condition and provision of resources at facilities. Aid posts are less likely to have refrigeration or drugs available, and

more remote clinics are less likely to have water access but have a higher share of clinic positions filled by workers.

Compared to government run clinics, church run clinics are estimated to have a 17 percentage point higher probability of water access and private run clinics have an 80 percentage point higher probability of refrigeration, controlling for other characteristics. Private clinics are also estimated to have a 21 percentage point higher score on the drug availability index.

OICs who have access to larger user fee revenue and those who choose to fund fuel expenses from this revenue source are more likely to have fuel available at the clinic, but OICs who have been in the position for a long time are less likely to have fuel available.

Table 8-14: Results for health clinic resources regressions

	WATER ACCESS (0/1)	REFRIGERATION (0/1)	DRUG AVAILABILITY INDEX	FUEL AVAILABLE (0/1)	ZERO DOCTOR VISITS (0/1)	WORKERS TO CLINIC POSITIONS
AID POST (0/1)		-55.28 (7.96)***	-24.49 (2.97)***			9.13 (5.35)*
CHURCH (0/1)	17.08 (8.51)**					
PRIVATE (0/1)		80.1 (24.81)***	21.02 (7.05)***			
CLINIC REMOTENESS INDEX (hours)	-3.35 (1.87)*					2.52 (0.64)***
CLINIC SIZE (tens of patient visits per day)			0.70 (0.39)*			2.09 (0.77)***
NUMBER OF YEARS OIC				-1.03 (0.41)**		0.73 (0.39)*
PATIENTS PAY FOR VISITS (0/1)			8.55 (3.70)**			
USER FEES - FUND FUEL (0/1)				25.2 (9.66)**		
USER FEES RAISED (K100 PER MONTH)		0.98 (0.37)***	0.24 (0.11)**	0.67 (0.39)*		
FUNDING SUPPORT (0/1)			7.20 (3.45)**			
IN-KIND SUPPORT (0/1)	17.59 (8.00)**	11.85 (6.35)*		14.94 (7.72)*		
CLINIC SUPERVISOR (0/1)			7.13 (3.43)**		-22.49 (5.51)***	
VILLAGE HEALTH COMMITTEE (0/1)			5.1 (2.77)*			
COMMUNITY ASSISTANCE (0/1)	14.64 (8.67)*					
Province dummies	YES	YES	YES	YES	YES	YES
R ²	0.76	0.78	0.96	0.76	0.90	0.94
N	115	114	114	117	124	94

Notes: Linear regression results based on 2012 data. Only variables with coefficients significantly different from zero at the 10% level are presented. Heteroskedastic consistent standard errors in parentheses; ***, **, and * indicates variable is significantly different from zero at the 1%, 5% and 10 % level, respectively.

Clinics that charge patients for treatment, receive more in user fees, and receive funding support are more likely to have drugs and medical supplies available. This finding may reflect better management practices at facilities with better drug availability or, perhaps to some degree, a lower rate of drug consumption in facilities that charge for their use. Clinics that are able to identify a supervisor score seven percentage points higher on the drug availability index. Clinics that are

able to source in-kind support and funding from health funding providers and health programs are more likely to have access to water, refrigeration and fuel at the clinic.

Aid posts score 24 percentage points lower on drug availability but facilities supported by a VHC score about 5 percentage points higher. Church-run facilities and those that receive community assistance are estimated to have about a 20 and 17 percentage point higher probability of having access to water, respectively.

Doctor visits are positively related to when clinics are able to identify a supervisor; having a supervisor reduces the probability of zero doctor visits to the clinic by 22 percentage points.

Regression findings for health clinic management outcomes

The results of regressions on management performance measures are presented in Table 8-15. Compared to government run clinics, church run clinics are estimated to have a 16 percentage point higher probability of workers at the clinic often or all of the time, 14 percentage point lower probability of funding problems at the clinic, and a 14 percentage point higher probability of patients being attended to on arrival. Private run clinics also perform well on these measures.

Not surprisingly, higher user fee revenue at clinics is associated with a lower probability of funding problems. This is also the case for clinics that receive in-kind support. However, clinics that receive in-kind support were less likely to have workers at the clinic often or all of the time. Clinics that received funding support were also more likely to attend to patients when they arrived.

Clinics that did not receive a doctor visit were estimated to have a 26 percentage point lower probability of workers being at the clinic often or all of the time. Interestingly there results show a negative relationship between COMMUNITY ASSISTANCE and WORKERS AT CLINIC, indicating that community sourced workers at clinics and official clinic workers are substitutes to some degree.

Table 8-15: Results for health clinic management regressions

	WORKERS AT CLINIC (0/1)	FUNDING PROBLEMS (0/1)	STAFFING PROBLEMS (0/1)	PATIENTS SEEN ON ARRIVAL (0/1)
AID POST (0/1)				13.12 (7.88)*
CHURCH (0/1)	17.61 (8.08)**	-14.05 (8.40)*		13.91 (5.27)***
PRIVATE (0/1)	78.62 (15.05)***	-45.00 (15.38)*	-49.44 (18.46)***	
CLINIC SIZE (patient visits per typical day)	3.34 (1.30)**			
BORN IN DISTRICT OIC (0/1)	-13.24 (7.32)*			
USER FEES RAISED (K100 PER MONTH)		-0.83 (0.49)**		
FUNDING SUPPORT (0/1)	14.93 (8.96)*			12.20 (7.23)*
IN-KIND SUPPORT (0/1)		-21.41 (8.47)**		
COMMUNITY ASSISTANCE (0/1)	-22.48 (8.20)***			
Patient respondent dummies	YES	YES	YES	YES
Province dummies	YES	YES	YES	YES
R ²	0.82	0.56	0.51	0.91
N	109	111	112	110

Notes: Linear regression results based on 2012 data. Only variables with coefficients significantly different from zero at the 10% level are presented. Heteroskedastic consistent standard errors in parentheses; ***, **, and * indicates variable is significantly different from zero at the 1%, 5% and 10 % level, respectively. Patient respondent dummies (patient has officials ties to the clinic, patient has official responsibilities at the clinic, patient has relatives who work at the clinic) capture personal data on the patient who provided the dependent variable data.

Regression findings for health clinic outputs

Apart from directly treating patients, the main activities of health facilities relate to conducting health patrols and health promotion in the local community, as well as transferring patients to higher level facilities when needed. Aid posts are less likely to be able to perform these activities and church-run clinics are much better performers than government-run clinics (see Table 8-16). Church run clinics are estimated to conduct 14 more health patrols than government facilities, or have about a 13 percentage point higher probability of conducting more than 10 health patrols in a year. Church-run clinics also have about a 15 percentage point higher probability of being able to transfer patients relative to government facilities. Privately-run clinics perform much better than government clinics in delivering health promotion activities. Compared to government run clinics, church run clinics are estimated to have a 17 percentage point lower probability of having service quality problems, and private clinics are estimated to have a 55 percentage point higher probability of meeting the community's health needs.

OICs that have been in the position for long periods are less likely to conduct health promotion in the community or transfer patients and are more likely to be at clinics which have service quality problems.

OICs that raise user fees specifically to fund patient transfers have a much higher probability (around 14 percentage points) of being able to carry out this activity. User fees are also estimated to be an important input to carrying out more than 10 health patrols in a year. Clinics that are able to source funding support are estimated to have a 15 percentage point lower probability of service quality problems, and a 19 percentage point probability of being able to meet the community's health needs.

Table 8-16: Results for health clinic output regressions

	HEALTH PATROLS	PATROLS GREATER THAN 10	HEALTH PROMOTION (0/1)	TRANSFER PATIENTS (0/1)	SERVICE QUALITY PROBLEMS (0/1)	MEETS COMMUNITY NEEDS (0/1)
AID POST (0/1)	-9.52 (5.87)**			-24.75 (6.95)***	-27.5 (10.15)***	
CHURCH (0/1)	13.57 (6.75)**	12.62 (5.69)**		15.30 (6.78)**	-16.19 (7.98)**	
PRIVATE (0/1)			43.88 (10.09)***			53.95 (18.16)***
CLINIC REMOTENESS INDEX (hours)			-2.61 (1.26)**			
CLINIC SIZE (tens of patient visits per day)					-2.92 (1.57)*	
BORN IN DISTRICT OIC (0/1)		-11.55 (6.22)*			15.46 (8.27)*	
NUMBER OF YEARS OIC			-1.29 (0.48)***	-1.12 (0.41)***	1.35 (0.51)***	
USER FEES - FUND TRANSFER (0/1)				14.38 (7.07)**		
USER FEES RAISED (K100 PER MONTH)		0.79 (0.38)**				
FUNDING SUPPORT (0/1)						19.79 (7.00)***
IN-KIND SUPPORT (0/1)			14.19 (6.59)**			
COMMUNITY ASSISTANCE (0/1)			18.44 (6.84)***			
Patient respondent dummies	NO	NO	NO	NO	YES	YES
Province dummies	YES	YES	YES	YES	YES	YES
R ²	0.45	0.47	0.86	0.86	0.44	0.89
N	111	119	109	124	113	108

Notes: Linear regression results based on 2012 data. Only variables with coefficients significantly different from zero at the 10% level are presented. Heteroskedastic consistent standard errors in parentheses; ***, **, and * indicates variable is significantly different from zero at the 1%, 5% and 10 % level, respectively. Patient respondent dummies (patient has officials ties to the clinic, patient has official responsibilities at the clinic, patient has relatives who work at the clinic) capture personal data on the patient who provided the dependent variable data.

8.7 Overall findings

The regression analysis highlights many determinants of good performance across infrastructure, resources and equipment, management, and facility output related variables. From this perspective, the results indicate that initiatives aimed at strengthening facilities should not have a narrow focus, such as on providing higher levels of funding alone; institutional strengthening should instead take a multi-dimensional approach.

Overall, management characteristics of schools and health facilities appear to have the greatest impact on performance outcomes. For schools, the make-up of the BoM (the share of parents and females), whether the BoM meets regularly, and whether the BoM has the most say on making decisions related to the school are all important.

For health clinics, good performance requires management to raise user fee revenue, budget and apply for support from health funding providers, and direct funds and other resources to performing key activities at the clinic. As noted in Chapter 6, the recently introduced free health policy, which reduces the ability of health facilities to raise user fees, may undermine the ability of health facilities in this regard.

While facility management characteristics are important, it is also important to consider the role that the local community plays in driving better facility management. Community interaction variables provide a positive impact on facility performance on their own, but there is evidence from the regression results that they also positively impact on facility management.

The question for policy makers is how they can vary policy settings to achieve better performance outcomes at schools and health facilities. For schools, facility management can be improved by strengthening the oversight role of the BoM, the P&C and Standards Officers. Despite substantial increases in primary education funding in PNG over the last decade, the quantity of inspections by SOs has not improved. But the quality of SO inspections has improved and has had a positive impact on school performance.

For health clinics, improvements can be made by replicating the strengths of the primary education system within the primary health sector. Health clinics do not have an equivalent of a school BoM and so the OIC, who tends to come from a medical rather than a management background, is often responsible for facility management. The VHC may be seen as an equivalent of the P&C at schools, but there are fewer of them, especially in relation to health centres rather than aid posts. Further research is needed to understand how and why VHCs are established in some, but not other, health facility catchment areas, and the activities that VHCs undertake. While schools are able to identify supervisors that oversee their operations, this is not the case for many health clinics. Overall, the formal and informal mechanisms for ensuring that health clinics are performing adequately are weak relative to those in the education system. There is also evidence that health clinic performance across a number of measures declines as the number of years the OIC has been in the position increases. Rejuvenation of health clinic management may then be an important way of improving the primary health care sector.

Finally, the regression analysis provides evidence that, controlling for other variables, church-run schools and health clinics perform better than government-run facilities across a range of measures. In particular, according to P&C representatives, teachers are more likely

to spend most of their time teaching at church schools than at government ones, and whether teachers spend time teaching turns out to be the critical determinant of whether children attend school. Teachers are 14 percentage points more likely to be often or always teaching in church schools and 13 percentage points more likely to be on time at school. Church clinics also perform better than government clinics across a range of dimensions. Church clinics are 17 per cent more likely to have water access, 13 per cent more likely to have more than 10 health patrols a year, 15 percentage points more likely to be able to transfer patients, and 16 percentage points less likely to have service quality problems. Health workers at church clinics are also 18 percentage points more likely to be at the clinic often or all of the time and 14 percentage points more likely to attend to patients on arrival. Church clinics are 14 percentage points less likely to have funding problems compared to government clinics.

It would appear that church facilities are better able to discipline, motivate and/or incentivise their workers. In the case of health clinics, it seems that they are better equipped, and more likely to carry out basic services.