PAPUA NEW GUINEA:

PUBLIC EXPENDITURE AND SERVICE DELIVERY (PESD)

Annexes

30 June 2004

TABLE OF CONTENTS

ANNEX 1: NOTES ON SAMPLING WEIGHTS

Sample Design

Schools were selected through a combination of purposive sampling at the province level, and random sampling at the district and school levels. In the first stage, two provinces were chosen from each of the four main regions in PNG, with one less disadvantaged and one more disadvantaged province selected from each region. The included provinces are:

Southern (Papuan) region:	Gulf; National Capital District (NCD)
Highlands region:	Enga; Eastern Highlands
Momase region:	West Sepik (Sandaun); Morobe
Islands region:	West New Britain; East New Britain

At the second stage, three districts were randomly selected within provinces using a Probability Proportional to Size (PPS) method, where size was defined by the number of schools in the district. Gulf and West New Britain provinces had only two districts each, so in their case both districts were selected. For NCD, which does not have districts but is organized by wards/census enumeration areas, there was no second stage selection.

At the final stage, ten schools were then selected at random from each district. For NCD 30 schools were randomly selected. This yielded a total sample of 220 schools, comprising 20 schools each from Gulf and West New Britain, and 30 schools from each of the remaining six provinces (including NCD). However, some of the schools in this original sample could not be surveyed due to school closures and logistical difficulties. The final sample consisted of 214 schools. Its distribution across provinces and districts is shown in Table A1.1.

Calculation of weights

The sampling weights reflect the probability of a school being selected from all the schools in a given province. The results of the calculations described here are presented in Table A1.1.

In order for a given school to be selected into the sample, two random events must transpire. Its district must first be selected, and then the school itself must be chosen from all of the schools in the district. So the overall probability of selection is simply the product of the probabilities of each event occurring. Defining a school S_i, in district D_i and province P_i, we can write:

$$P(S_i \text{ selected}) = P(S_i \text{ selected} \mid D_i \text{ selected}) \cdot P(D_i \text{ selected}).$$

Probability of a district being selected

Districts in Gulf, West New Britain and NCD were automatically selected, and so have a selection probability of one. Three districts were selected from each of the remaining provinces using PPS sampling. This procedure defines the probability of a district being selected in any draw as the number of schools in the district divided by the number of schools in the province, so the overall probability of selection is three times this ratio:

$$P(D_i \text{ selected}) = 3 \cdot \left(\frac{\text{number of schools in } D_i}{\text{number of schools in } P_i} \right).$$

The calculated probabilities of selection for each district are listed in column (c). In East New Britain, two districts (Gazelle and Pomio) were large enough to be selected twice, so the calculated probabilities for these districts were greater than one. We set these probabilities equal to one, and redistribute the excess probability equally between the other two districts.
A Monte Carlo simulation produced empirical estimates of the probabilities which are extremely close to the theoretical results. These estimates are reported in column (d).

Probability of a school being selected

Each school in a selected district has a probability of selection equal to the number of schools selected from the district, divided by the total number of schools in the district:

$$P(S_i \text{ selected} \mid D_i \text{ selected}) = \frac{\text{number of schools selected from } D_i}{\text{number of schools in } D_i}.$$

The probabilities of each school being selected are reported in column (e).

Overall probability of selection

The overall probability of selection, reported in column (f), is the product of columns (c) and (e). Column (g) reports expansion factors for each school, which are simply the inverse of the overall probabilities. These give the number of schools in the province represented by each selected school.[1]

The estimated weights are on average greater than one, so the sum of the weights across schools exceeds the number of schools in the survey. To correct for this, the expansion factors were scaled down by a common factor. This also forces the average normalized weight across all schools to be one. The normalized weights and expansion factors are given in columns (i) and (j).

---

[1] The sum of expansion factors for all selected schools in a province should, by definition, equal the total number of schools in that province. Because of the adjustment to the weights for ENB schools described earlier, the expansion factors for ENB schools sum to slightly more than the total 146 schools in the province. We therefore scale the expansion factors for ENB down slightly so they sum to 146.

Table A1.1:Calculation of School Sampling Weights

Province / District	Number in district	Number in survey	Probability of district selection		Probability of school selection	Overall probability of selection (c*e)	Expansion factor	Number represented	Normalized weight	Normalized number represented
			Calculation	Monte Carlo Simulation						
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
NCD	**39**	**30**						**39**		
NCD	39	30	1.000	--	0.769	0.769	1.300	39	0.218	7
West New Britain	**152**	**16**						**152**		
Kandrian - Gloucester	79	8	1.000	--	0.101	0.101	9.875	79	1.659	13
Talasea	73	8	1.000	--	0.110	0.110	9.125	73	1.533	12
East New Britain	**146**	**30**						**146**		
Gazelle	54	10	1.000	1.000	0.185	0.185	5.338	53	0.897	9
Kokopo	32	10	0.716	0.716	0.313	0.224	4.419	44	0.742	7
Pomio	49	10	1.000	0.996	0.204	0.204	4.843	48	0.814	8
Rabaul	11	--	0.284	0.281	--	--	--	--	--	--
Enga	**138**	**30**						**138**		
Kandep	17	10	0.370	0.362	0.588	0.217	4.600	46	0.773	8
Kompiam - Ambum	23	--	0.500	0.504	--	--	--	--		
Lagaip - Porgera	39	10	0.848	0.847	0.256	0.217	4.600	46	0.773	8
Wabag	31	10	0.674	0.672	0.323	0.217	4.600	46	0.773	8
Wapenamanda	28	--	0.609	0.608	--	--	--	--	--	--
Sandaun	**182**	**30**						**182**		
Aitape - Lumi	50	10	0.824	0.827	0.200	0.165	6.067	61	1.019	10
Nuku	42	10	0.692	0.691	0.238	0.165	6.067	61	1.019	10
Telefomin	36	10	0.593	0.589	0.278	0.165	6.067	61	1.019	10
Vanimo Green River	54	--	0.890	0.887	--	--	--	--	--	--
Gulf	**108**	**19**						**108**		
Kerema	55	9	1.000	--	0.164	0.164	6.111	55	1.027	9
Kikori	53	10	1.000	--	0.189	0.189	5.300	53	0.890	9
Eastern Highlands	**218**	**29**						**218**		
Daulo	16	--	0.220	0.219	--	--	--	--	--	--
Goroka	19	--	0.261	0.265	--	--	--	--	--	--
Henganofi	24	--	0.330	0.331	--	--	--	--	--	--
Kainantu	27	10	0.372	0.371	0.370	0.138	7.267	73	1.221	12
Lufa	26	--	0.358	0.359	--	--	--	--	--	--
Obura - Wonenara	34	9	0.468	0.468	0.265	0.124	8.074	73	1.356	12
Okapa	44	--	0.606	0.598	--	--	--	--	--	--
Unggai - Bena	28	10	0.385	0.384	0.357	0.138	7.267	73	1.221	12
Morobe	**291**	**30**						**291**		
Wau - Bulolo	43	--	0.443	0.441	--	--	--	--	--	--
Finschafen	36	10	0.371	0.374	0.278	0.103	9.700	97	1.629	16
Huon	42	10	0.433	0.437	0.238	0.103	9.700	97	1.629	16
Kabwum	26	--	0.268	0.267	--	--	--	--	--	--
Lae	19	--	0.196	0.195	--	--	--	--	--	--
Markham	34	--	0.351	0.349	--	--	--	--	--	--
Menyamya	26	--	0.268	0.265	--	--	--	--	--	--
Nawaeb	27	--	0.278	0.277	--	--	--	--	--	--
Tewae - Siassi	38	10	0.392	0.391	0.263	0.103	9.700	97	1.629	16
Overall	**1274**	**214**						**1274**		**214**

ANNEX 2: CONSTRUCTION OF POVERTY MEASURES

Disaggregated maps of poverty in Papua New Guinea are created by combining information from the 1996 National Household Survey (NHS) with data from the 2000 National Census, and from resource and agricultural mapping databases with national coverage.

The basic approach involves estimating a model of consumption (per adult equivalent) based on the 1996 NHS and then using the 2000 Census data to predict poverty measures at higher level of spatial disaggregation – up to the LLG-level. For constructing these maps, we have followed the methodology of Elbers *et al.* (2002), which pays more attention to heteroscedasticity, spatial autocorrelation and other location effects, and which uses simulation methods to calculate the predicted poverty indices and standard errors.

The basic consumption model used for the poverty mapping exercise is reported in Table A2.1.

For some of the analysis, we classify poverty levels into four categories, using the following bounds on the estimated headcount indices:
- Well-off (0 to 0.15 inclusive);
- Not poor (0.15 to 0.25 inclusive);
- Poor (0.25 to 0.4 inclusive);
- Very poor (index greater than 0.4).

Table A2.1: Log consumption model used for poverty mapping

No. of rooms in dwelling	**0.078**
	(3.63)**
Household size (log)	**-0.478**
	(6.39)**
% of HH age 7-14 years	**-0.358**
	(2.42)*
School years of HH head	**0.033**
	(4.51)**
Wages main income HH head	**0.35**
	(3.24)**
Income from running a store	**0.272**
	(2.22)*
Income from running a PMV	**0.656**
	(4.33)**
Dummy: Altitude 1200-1800 m	**0.307**
	(2.57)*
Dummy: Altitude > 1800 m	**0.443**
	(2.83)**
Annual rainfall ('000 mm)	**-1.183**
	(3.82)**
Annual rainfall squared	**0.167**
	(3.08)**
Dummy: Slope > 10 degrees	**-0.382**
	(4.28)**
Dummy: land inundation occurs	-0.173
	(1.63)
Dummy: Rainfall deficit is rare	**0.266**
	(2.62)*
Ag. Syst. Remote from services	**-0.377**
	(2.87)**
LLG % HH head main income wages	**0.908**
	(2.07)*
LLG % HH earning from betel nut	**0.553**
	(2.02)*
Constant	**2.465**
	(4.80)**
R-squared	0.34

Note: The dependent variable is the log of nominal consumption deflated by a region-specified poverty line. The sample is 830 rural households from the 1996 PNG National Household Survey.

Absolute value of t-statistics in parentheses corrected for clustering, stratification and weighting. * significant at 5%; ** significant at 1%.

ANNEX 3: CONSTRUCTION OF THE REMOTENESS INDEX

Overview

Questions 64 to 79 in Section 1C of the S1 (head teacher) questionnaire give measures of each school's access to 16 commonly-used 'facilities' (such as a police station and a bank). The survey asks the respondent for estimates of three measures of each facility's remoteness from the school: the distance from the school to the facility, the travel time to the facility, and the mode of transport required. This annex describes the construction of a *single* index of remoteness for each school, which takes all of these measures into account.

Construction of the index

One could use many methods to combine the three measures of remoteness, and could give different weights to each facility (for instance, by down-weighting a vocational center relative to a police station). We take an agnostic approach, giving equal weight to each measure of remoteness and each facility.

Two of the survey's remoteness measures, distance and mode of transport, are recorded categorically. Distance is recorded as falling into one of six categories, while four modes of transport are listed.[2] We take the survey's categorical codes as the numerical values for these measures.[3] These measures, along with the number of hours' travel to the facility, are normalized according to the following rule:

$$\widetilde{X}_i = \frac{X_i - X_{min}}{X_{max} - X_{min}}$$

where X_i is the measure of remoteness of school i from a given facility, and X_{max} and X_{min} are the maximum and minimum values of the measure (across schools) for the facility in

---

[2] The distance categories (with codes in brackets) are (0) in school; (1) within 1km; (2) within 5km; (3) within 20km; (4) within 100km; and (5) more than 100km. The mode of transport question has four categories: (1) walk; (2) vehicle; (3) boat; (4) plane. For both questions, we treat 'don't know' responses as missing values.

[3] For mode of transport, we give boat and vehicle the same value, so the variable is recoded to (0) walk; (1) vehicle/boat; (2) plane.

question. The normalization turns each remoteness measure into a variable between 0 and 1, where 1 is the most remote, and 0 the least remote.

A 'score' of the remoteness of each facility is then obtained by averaging the three normalized measures for each school. The 16 scores for each school are then averaged again, yielding an aggregate index of remoteness between 0 and 1. Missing responses for any question were excluded from the average. Figure A3.1 shows the distribution of index values for all 214 schools.

Figure A3.1: Distribution of remoteness index	Table A3.1: Proportion of schools in each remoteness category		
		Unweighte	Weighted
	Readily Accessible	20.6	12.4
	Accessible	33.0	35.7
	Remote	28.2	30.9
	Extremely Remote	18.2	21.0
		100	100
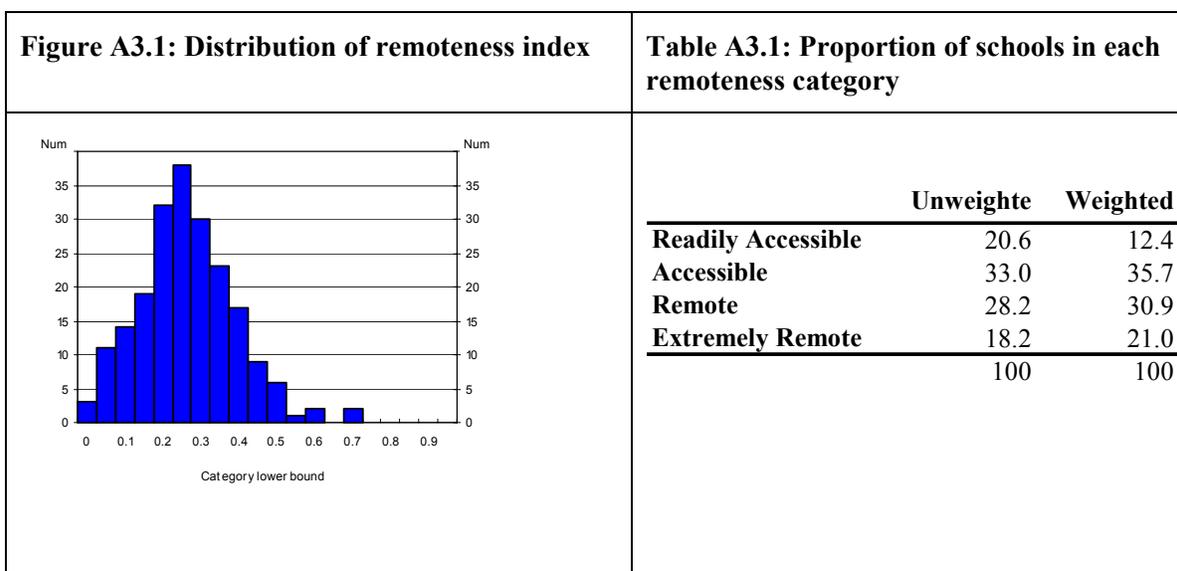
We classify remoteness into four categories, using arbitrary bounds on the constructed remoteness index.[4] The four categories, and their bounds, are:
- readily accessible (0 to 0.194 inclusive);
- accessible (0.194 to 0.29 inclusive);
- remote (0.29 to 0.4 inclusive);
- extremely remote (index greater than 0.4).

Using this classification, a reasonably large proportion of schools fall into each category. Furthermore, the classification is quite symmetrical. The unweighted and weighted proportions are summarized in Table A3.1.

Viewing the distribution of schools across categories on its own can be deceptive, however, since the number of schools in each category varies quite widely across provinces (Table A3.2). NCD, for instance, has only five schools rated less than 'readily accessible', and dominates the 'readily accessible' category'. Conversely, in the Gulf province nearly all schools are considered 'remote' or 'extremely remote'.

---

[4] There were seven schools for which all of the remoteness questions were missing. These schools have a missing value for the remoteness measure. We were able to allocate remoteness *categories* to two of the schools based on the interviewers' field notes. This leaves five of the 214 schools missing both index and category.

Table A3.2: Distribution of Remoteness Measures by Province

	Readily Accessible	Accessible	Remote	Extremely Remote	Total
NCD	25	4	1	0	**30**
Enga	6	10	10	2	**28**
Eastern Highlands	3	15	11	0	**29**
Morobe	3	7	7	12	**29**
East New Britain	2	12	7	9	**30**
Sandaun	2	10	9	9	**30**
West New Britain	2	8	4	1	**15**
Gulf	0	3	10	5	**18**
Total	**43**	**69**	**59**	**38**	**209**

The poverty rate and the remoteness index are significantly correlated across the PESD sample. The weighted correlation coefficient is 0.15 while the unweighted correlation is 0.27, both statistically significant at the 5% level or better.

ANNEX 4: ADDITIONAL TABLES ON SCHOOL FACILITIES AND ENVIRONMENT

Table A4.1: School background, by agency and type

	Agency				Type			
	Government		Church		Primary		Community	
	Mean	(SE)	Mean	(SE)	Mean	(SE)	Mean	(SE)
Government school (0/1)	0.00	0.00	0.00	0.00	0.57	0.07	0.49	0.06
Primary school (0/1)	0.39	0.06	0.32	0.06	0.00	0.00	0.00	0.00
Year established	1977	1.69	1971	1.42	1967	1.83	1979	1.23
Year became primary (among primary)	1999	0.53	1999	0.39	1999	0.38	0.00	0.00
Number of students	264	24.61	200	16.75	372	22.83	156	7.78
Percent of students girls	0.45	0.01	0.43	0.01	0.43	0.01	0.44	0.01
School land owned by …(0/1)								
… customary	0.60	0.08	0.48	0.06	0.24	0.07	0.72	0.05
… state	0.29	0.06	0.07	0.02	0.35	0.05	0.10	0.04
… church	0.02	0.02	0.42	0.06	0.28	0.05	0.15	0.04
… school	0.03	0.02	0.03	0.02	0.06	0.03	0.01	0.01

Source: PESD 2002. Means of valid responses.

Table A4.2: School Background, by non-grant revenue per student

	Non-grant per student revenue quintiles							
	Bottom 40%		Middle 40%		Top 20%		Missing non-grant	
	Mean	(SE)	Mean	(SE)	Mean	(SE)	Mean	(SE)
Government school (0/1)	0.46	0.09	0.45	0.08	0.28	0.16	0.58	0.06
Primary school (0/1)	0.27	0.06	0.35	0.08	0.79	0.15	0.35	0.06
Year established	1977	1.66	1972	2.56	1959	3.29	1976	1.00
Year became primary (among primary)	1999	0.70	2000	0.53	1997	1.06	1999	0.30
Number of students	211	23.78	233	16.94	431	56.72	223	22.66
Percent of students girls	0.44	0.03	0.44	0.01	0.43	0.01	0.44	0.00
School land owned by …(0/1)								
… customary	0.63	0.09	0.49	0.09	0.10	0.09	0.59	0.08
… state	0.28	0.09	0.14	0.04	0.32	0.12	0.16	0.05
… church	0.09	0.04	0.27	0.07	0.58	0.15	0.18	0.04
… school	0.00	0.00	0.08	0.05	0.00	0.00	0.03	0.02

Source: PESD 2002. Means of valid responses.

Table A4.3: Physical infrastructure at schools, by agency and type

| | Agency | | | | Type | | | |
| | Government | | Church | | Primary | | Community | |
	Mean	(SE)	Mean	(SE)	Mean	(SE)	Mean	(SE)
Classrooms								
Number of classrooms per 100 students	**3.42**	0.23	**3.52**	0.17	**3.22**	0.16	**3.60**	0.23
Proportion of classrooms								
... made of permanent materials?	**0.65**	0.04	**0.63**	0.05	**0.80**	0.04	**0.55**	0.04
... made of semi-permanent materials?	**0.18**	0.04	**0.22**	0.05	**0.15**	0.04	**0.23**	0.05
... made of bush materials?	**0.17**	0.02	**0.15**	0.03	**0.05**	0.01	**0.22**	0.02
… which need to be completely rebuilt?	**0.34**	0.05	**0.31**	0.04	**0.29**	0.03	**0.35**	0.04
... with a roof that leaks when it rains?	**0.38**	0.03	**0.36**	0.04	**0.29**	0.02	**0.42**	0.02
... a chair and table for the teacher?	**0.44**	0.06	**0.40**	0.08	**0.47**	0.06	**0.39**	0.08
... storage space that can be locked ?	**0.30**	0.04	**0.24**	0.04	**0.33**	0.05	**0.24**	0.02
... with electricity that works?	**0.09**	0.02	**0.04**	0.01	**0.13**	0.03	**0.03**	0.01
Other infrastructure								
Adequate or good provision (0/1) of …								
… administration block	**0.21**	0.04	**0.12**	0.03	**0.28**	0.07	**0.11**	0.02
… clear radio reception	**0.33**	0.05	**0.23**	0.06	**0.32**	0.04	**0.26**	0.05
… school vehicle	**0.04**	0.02	**0.01**	0.01	**0.02**	0.01	**0.03**	0.02
… agriculture area for student use	**0.53**	0.05	**0.66**	0.04	**0.55**	0.05	**0.62**	0.05
… agriculture area for teacher use	**0.43**	0.05	**0.49**	0.05	**0.39**	0.05	**0.50**	0.04
… land for expansion	**0.55**	0.05	**0.65**	0.03	**0.53**	0.04	**0.64**	0.05
… sports area	**0.65**	0.04	**0.73**	0.06	**0.71**	0.04	**0.67**	0.05
… sports equipment	**0.39**	0.06	**0.46**	0.06	**0.49**	0.07	**0.38**	0.05
… specialist science classroom	**0.02**	0.01	**0.01**	0.01	**0.04**	0.01	**0.00**	0.00
… specialist technology classroom	**0.05**	0.02	**0.02**	0.02	**0.11**	0.04	**0.00**	0.00
… specialist home economics classroom	**0.08**	0.03	**0.02**	0.02	**0.13**	0.05	**0.01**	0.01

Source: PESD 2002. Means of valid responses.

Table A4.4: Physical infrastructure at schools, by non-grant revenue per student

| | Non-grant per student revenue quintiles | | | | | | | |
| | Bottom 40% | | Middle 40% | | Top 20% | | Missing non-grant | |
	Mean	(SE)	Mean	(SE)	Mean	(SE)	Mean	(SE)
Classrooms								
Number of classrooms per 100 students	**3.46**	0.40	**3.67**	0.45	**2.96**	0.44	**3.43**	0.18
Proportion of classrooms								
... made of permanent materials?	**0.55**	0.05	**0.59**	0.07	**0.92**	0.04	**0.66**	0.04
... made of semi-permanent materials?	**0.25**	0.04	**0.20**	0.07	**0.08**	0.04	**0.20**	0.04
... made of bush materials?	**0.20**	0.04	**0.22**	0.07	**0.00**	0.00	**0.14**	0.02
… which need to be completely rebuilt?	**0.38**	0.05	**0.28**	0.04	**0.25**	0.10	**0.33**	0.03
... with a roof that leaks when it rains?	**0.35**	0.04	**0.31**	0.05	**0.29**	0.09	**0.41**	0.03
... a chair and table for the teacher?	**0.39**	0.10	**0.38**	0.07	**0.45**	0.17	**0.45**	0.09
... storage space that can be locked ?	**0.31**	0.07	**0.24**	0.06	**0.37**	0.10	**0.26**	0.03
... with electricity that works?	**0.05**	0.04	**0.07**	0.02	**0.23**	0.12	**0.06**	0.01
Other infrastructure								
Adequate or good provision (0/1) of …								
… administration block	**0.12**	0.04	**0.13**	0.07	**0.33**	0.16	**0.18**	0.04
… clear radio reception	**0.28**	0.09	**0.34**	0.08	**0.30**	0.11	**0.26**	0.05
… school vehicle	**0.04**	0.04	**0.05**	0.04	**0.02**	0.02	**0.01**	0.01
… agriculture area for student use	**0.59**	0.07	**0.64**	0.08	**0.71**	0.10	**0.56**	0.06
… agriculture area for teacher use	**0.47**	0.05	**0.59**	0.08	**0.55**	0.10	**0.40**	0.06
… land for expansion	**0.63**	0.08	**0.60**	0.07	**0.60**	0.15	**0.59**	0.04
… sports area	**0.60**	0.11	**0.81**	0.07	**0.96**	0.02	**0.64**	0.03
… sports equipment	**0.30**	0.05	**0.45**	0.09	**0.73**	0.17	**0.43**	0.07
… specialist science classroom	**0.00**	0.00	**0.04**	0.02	**0.00**	0.00	**0.01**	0.01
… specialist technology classroom	**0.02**	0.02	**0.04**	0.02	**0.12**	0.12	**0.04**	0.02
… specialist home economics classroom	**0.02**	0.02	**0.04**	0.02	**0.12**	0.12	**0.06**	0.03

Source: PESD 2002. Means of valid responses.

Table A4.5: Electricity, water and sanitation, by agency and type

	Agency				Type			
	Government		Church		Primary		Community	
	Mean	(SE)	Mean	(SE)	Mean	(SE)	Mean	(SE)
Public grid/Elkom electricity (0/1)	0.19	0.03	0.11	0.03	0.28	0.04	0.08	0.03
Usable water tank (0/1)	0.51	0.06	0.59	0.09	0.69	0.06	0.47	0.06
Main source of drinking water supply …								
… none	0.03	0.02	0.01	0.01	0.00	0.00	0.03	0.02
… rain water tank	0.40	0.07	0.49	0.09	0.61	0.08	0.35	0.05
… spring/lake river	0.34	0.08	0.32	0.09	0.11	0.05	0.46	0.07
… well/bore hole	0.06	0.02	0.06	0.02	0.04	0.03	0.07	0.02
… piped water	0.16	0.03	0.12	0.03	0.23	0.04	0.08	0.02
Able to drink from that source today (0/1)	0.90	0.05	0.87	0.03	0.90	0.04	0.88	0.03
Available all year round 2001 (0/1)	0.58	0.04	0.58	0.05	0.46	0.06	0.64	0.05
Toilet facilities …								
… none available for teachers(0/1)	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.01
… none available for boys(0/1)	0.03	0.01	0.02	0.02	0.03	0.02	0.02	0.01
… need at least 1 for boys(0/1)	0.42	0.05	0.42	0.05	0.50	0.05	0.37	0.03
… none available for girls(0/1)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
… need at least 1 for girls(0/1)	0.50	0.04	0.47	0.05	0.54	0.05	0.45	0.06

Source: PESD 2002. Means of valid responses.

Table A4.6: Electricity, water and sanitation, by non-grant revenue per student

	Non-grant per student revenue quintiles							
	Bottom 40%		Middle 40%		Top 20%		Missing non-grant	
	Mean	(SE)	Mean	(SE)	Mean	(SE)	Mean	(SE)
Public grid/Elkom electricity (0/1)	0.11	0.06	0.17	0.05	0.59	0.19	0.12	0.03
Usable water tank (0/1)	0.51	0.11	0.62	0.10	0.64	0.13	0.53	0.06
Main source of drinking water supply …								
… none	0.00	0.00	0.04	0.03	0.00	0.00	0.02	0.02
… rain water tank	0.39	0.11	0.49	0.10	0.53	0.14	0.44	0.07
… spring/lake river	0.33	0.11	0.21	0.09	0.15	0.14	0.39	0.07
… well/bore hole	0.06	0.04	0.09	0.05	0.00	0.00	0.05	0.03
… piped water	0.22	0.08	0.17	0.04	0.32	0.13	0.08	0.01
Able to drink from that source today (0/1)	0.96	0.04	0.90	0.04	0.00	0.00	0.84	0.05
Available all year round 2001 (0/1)	0.67	0.08	0.49	0.07	0.53	0.18	0.58	0.05
Toilet facilities …								
… none available for teachers(0/1)	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01
… none available for boys(0/1)	0.02	0.02	0.00	0.00	0.00	0.00	0.04	0.03
… need at least 1 for boys(0/1)	0.44	0.07	0.49	0.08	0.32	0.21	0.40	0.04
… none available for girls(0/1)	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.03
… need at least 1 for girls(0/1)	0.49	0.09	0.55	0.07	0.55	0.18	0.46	0.05

Source: PESD 2002. Means of valid responses.

Table A4.7: Access to facilities, by agency and type

	Agency				Type			
	Government		Church		Primary		Community	
	Mean	(SE)	Mean	(SE)	Mean	(SE)	Mean	(SE)
Time to nearest …(hours)								
… High school or Secondary school	**3.91**	0.89	**3.95**	0.81	**2.39**	0.66	**4.82**	0.97
… Health center/aid post	**1.00**	0.22	**0.81**	0.48	**0.35**	0.17	**1.22**	0.37
… Vocational center	**3.34**	0.70	**3.38**	1.04	**2.04**	0.48	**4.19**	0.78
… Nearest store that sells basic materials	**4.06**	0.91	**5.16**	1.21	**2.15**	0.75	**6.05**	1.23
… Trade store	**0.61**	0.18	**0.91**	0.34	**0.46**	0.30	**0.92**	0.26
… Postal service	**3.93**	1.00	**3.98**	0.84	**2.24**	0.81	**4.97**	0.88
… Bank	**4.46**	1.07	**4.56**	0.95	**2.16**	0.72	**5.94**	0.91
… Police station	**6.21**	2.84	**3.48**	0.83	**1.27**	0.39	**7.23**	2.10
… Bitumen road	**3.81**	1.30	**4.23**	1.13	**1.74**	0.43	**5.59**	1.03
… PMV pickup point	**3.29**	1.17	**2.86**	0.87	**1.60**	0.36	**4.08**	0.91
… Town / station	**3.02**	0.67	**3.29**	0.81	**1.48**	0.41	**4.07**	0.69
… Provincial capital (of this province)	**5.11**	0.95	**8.33**	2.38	**2.62**	0.55	**8.91**	2.29
… Air strip	**4.21**	1.10	**4.17**	1.01	**2.27**	0.68	**5.33**	1.01
… Telephone that is working	**3.59**	0.83	**3.61**	0.85	**1.58**	0.41	**4.90**	0.93
… VHF radio that is working	**1.78**	0.46	**2.30**	0.76	**0.77**	0.16	**2.65**	0.64

Source: PESD 2002. Means of valid responses.

Table A4.8: Access to facilities, by non-grant revenue per student

	Non-grant per student revenue quintiles							
	Bottom 40%		Middle 40%		Top 20%		Missing non-grant	
	Mean	(SE)	Mean	(SE)	Mean	(SE)	Mean	(SE)
Time to nearest …(hours)								
… High school or Secondary school	**4.59**	1.48	**2.68**	0.68	**0.28**	0.07	**4.48**	1.12
… Health center/aid post	**2.06**	1.22	**0.88**	0.26	**0.14**	0.07	**0.58**	0.12
… Vocational center	**4.07**	1.51	**2.82**	0.68	**0.57**	0.09	**3.55**	0.86
… Nearest store that sells basic materials	**7.31**	2.30	**2.36**	0.60	**0.38**	0.06	**4.76**	1.30
… Trade store	**1.18**	0.51	**0.47**	0.22	**0.00**	0.00	**0.77**	0.33
… Postal service	**4.95**	1.46	**3.04**	0.89	**0.24**	0.06	**4.29**	1.12
… Bank	**6.15**	1.91	**2.65**	0.69	**0.45**	0.06	**4.98**	1.31
… Police station	**4.83**	1.49	**2.91**	0.70	**0.22**	0.06	**6.23**	2.61
… Bitumen road	**5.57**	2.09	**2.51**	1.28	**0.03**	0.03	**4.48**	1.76
… PMV pickup point	**3.51**	1.74	**2.21**	1.37	**0.01**	0.01	**3.64**	1.60
… Town / station	**4.72**	1.41	**2.35**	0.68	**0.24**	0.06	**3.16**	0.76
… Provincial capital (of this province)	**6.59**	1.57	**7.33**	3.77	**4.30**	3.40	**6.50**	1.41
… Air strip	**5.62**	1.83	**3.14**	0.80	**0.83**	0.17	**4.34**	1.12
… Telephone that is working	**4.84**	1.79	**2.98**	0.73	**0.33**	0.15	**3.79**	0.87
… VHF radio that is working	**3.23**	1.56	**1.25**	0.39	**0.08**	0.05	**1.95**	0.46

Source: PESD 2002. Means of valid responses.

Table A4.9: School closure and security, by agency and type

	Agency				Type			
	Government		Church		Primary		Community	
	Mean	(SE)	Mean	(SE)	Mean	(SE)	Mean	(SE)
School schedule								
Proportion of schools reporting closure ...								
… 2001	0.58	0.05	0.46	0.06	0.57	0.06	0.50	0.06
Total number of days the school closed in …								
… 2001	16.31	5.53	12.82	4.76	9.82	4.20	17.31	5.01
… 2002 (through to survey date)	3.01	0.72	3.15	1.00	1.30	0.38	4.06	0.85
Reasons of school closure in 2001 (0/1)								
… lack of water	0.42	0.06	0.31	0.08	0.50	0.10	0.29	0.05
… sewage/toilet problems	0.11	0.06	0.06	0.04	0.13	0.06	0.06	0.04
… poor facilities and maintenance	0.00	0.00	0.06	0.05	0.01	0.01	0.04	0.03
… shortage of teachers	0.03	0.03	0.12	0.05	0.03	0.03	0.09	0.04
… teacher pay problems	0.00	0.00	0.09	0.04	0.04	0.02	0.03	0.02
… school break-ins	0.05	0.03	0.02	0.02	0.03	0.02	0.04	0.03
… death in local community	0.10	0.04	0.09	0.05	0.06	0.04	0.12	0.04
… disputes between communities	0.06	0.03	0.04	0.02	0.07	0.03	0.04	0.03
… dispute between community and school	0.05	0.05	0.03	0.03	0.03	0.02	0.05	0.05
… special events/ poor weather	0.07	0.04	0.07	0.04	0.07	0.04	0.07	0.04
… other	0.02	0.02	0.04	0.04	0.00	0.00	0.04	0.03
Security								
With effective security fencing in 2002								
… around school	0.19	0.06	0.10	0.03	0.23	0.05	0.10	0.03
… around teacher houses	0.10	0.04	0.05	0.03	0.12	0.03	0.06	0.03
Employed security guards in 2002	0.19	0.04	0.11	0.04	0.33	0.05	0.05	0.03
Number of times broken into in …								
… 2000	0.86	0.16	0.59	0.15	0.88	0.13	0.64	0.15
… 2001	0.78	0.09	0.79	0.14	0.91	0.14	0.71	0.13
… 2002	0.42	0.07	0.36	0.08	0.46	0.07	0.36	0.08

Source: PESD 2002. Means of valid responses.

Table A4.10: School closure and security, by non-grant revenue per student

	Bottom 40% Mean	(SE)	Middle 40% Mean	(SE)	Top 20% Mean	(SE)	Missing non-grant Mean	(SE)
	Non-grant per student revenue quintiles							
School schedule								
Proportion of schools reporting closure ...								
… 2001	**0.47**	0.09	**0.55**	0.08	**0.68**	0.10	**0.52**	0.06
Total number of days the school closed in …								
… 2001	**17.24**	9.78	**18.42**	10.17	**2.51**	0.95	**13.56**	4.45
… 2002 (through to survey date)	**2.92**	1.22	**2.14**	1.33	**0.84**	0.50	**3.66**	0.76
Reasons of school closure in 2001 (0/1)								
… lack of water	**0.43**	0.14	**0.45**	0.09	**0.64**	0.20	**0.29**	0.07
… sewage/toilet problems	**0.05**	0.05	**0.04**	0.04	**0.21**	0.18	**0.11**	0.07
… poor facilities and maintenance	**0.05**	0.05	**0.00**	0.00	**0.00**	0.00	**0.03**	0.02
… shortage of teachers	**0.09**	0.08	**0.00**	0.00	**0.00**	0.00	**0.09**	0.05
… teacher pay problems	**0.04**	0.04	**0.07**	0.04	**0.00**	0.00	**0.02**	0.02
… school break-ins	**0.00**	0.00	**0.10**	0.08	**0.00**	0.00	**0.02**	0.02
… death in local community	**0.14**	0.07	**0.11**	0.08	**0.00**	0.00	**0.09**	0.04
… disputes between communities	**0.08**	0.07	**0.03**	0.03	**0.03**	0.04	**0.05**	0.03
… dispute between community and school	**0.00**	0.00	**0.12**	0.11	**0.00**	0.00	**0.02**	0.02
… special events/ poor weather	**0.00**	0.00	**0.07**	0.07	**0.12**	0.12	**0.09**	0.04
… other	**0.00**	0.00	**0.00**	0.00	**0.00**	0.00	**0.05**	0.04
Security								
With effective security fencing in 2002								
… around school	**0.09**	0.05	**0.18**	0.05	**0.40**	0.15	**0.14**	0.05
… around teacher houses	**0.06**	0.04	**0.08**	0.04	**0.24**	0.16	**0.07**	0.03
Employed security guards in 2002	**0.13**	0.05	**0.15**	0.08	**0.14**	0.10	**0.17**	0.04
Number of times broken into in …								
… 2000	**0.75**	0.27	**0.96**	0.34	**0.46**	0.19	**0.66**	0.15
… 2001	**0.91**	0.24	**0.99**	0.29	**0.49**	0.22	**0.69**	0.13
… 2002	**0.50**	0.18	**0.47**	0.18	**0.47**	0.19	**0.32**	0.06

Source: PESD 2002. Means of valid responses.

Table A4.11: Teaching resources, by agency and type

	Agency				*Type*			
	Government Mean	(SE)	Church Mean	(SE)	Primary Mean	(SE)	Community Mean	(SE)
Resource availability … (0/1)								
… sufficient textbooks for student use	**0.20**	0.06	**0.26**	0.05	**0.15**	0.03	**0.28**	0.07
… adequate or good provision of library	**0.11**	0.04	**0.16**	0.04	**0.21**	0.05	**0.08**	0.02
… adequate or good provision (0/1) of staff-rooms	**0.15**	0.05	**0.17**	0.04	**0.30**	0.07	**0.08**	0.02
… able to produce teaching aids	**0.79**	0.09	**0.77**	0.06	**0.79**	0.06	**0.77**	0.08
… enough desks for all students	**0.49**	0.08	**0.55**	0.06	**0.52**	0.06	**0.52**	0.06
… money allocated for classroom use	**0.13**	0.04	**0.11**	0.03	**0.14**	0.04	**0.10**	0.03

Source: PESD 2002. Means of valid responses.

Table A4.12: Teaching resources, by non-grant revenue per student

| | Non-grant per student revenue quintiles | | | | | | | |
| | Bottom 40% | | Middle 40% | | Top 20% | | Missing non-grant | |
	Mean	(SE)	Mean	(SE)	Mean	(SE)	Mean	(SE)
Resource availability … (0/1)								
… sufficient textbooks for student use	**0.30**	0.06	**0.23**	0.08	**0.08**	0.08	**0.21**	0.06
… adequate or good provision of library	**0.06**	0.05	**0.19**	0.06	**0.42**	0.10	**0.11**	0.03
… adequate or good provision (0/1) of staff-rooms	**0.08**	0.05	**0.13**	0.06	**0.33**	0.16	**0.19**	0.04
… able to produce teaching aids	**0.72**	0.09	**0.74**	0.10	**0.88**	0.08	**0.81**	0.06
… enough desks for all students	**0.61**	0.09	**0.51**	0.06	**0.69**	0.11	**0.46**	0.08
… money allocated for classroom use	**0.05**	0.03	**0.12**	0.05	**0.02**	0.03	**0.15**	0.03

Source: PESD 2002. Means of valid responses.

ANNEX 5: SUMMARY MEASURES OF SCHOOL AUTONOMY AND PARENTAL/COMMUNITY PARTICIPATION

There are multiple indicators of the extent to which a school makes its own decisions about things that affect it, as there are multiple indicators of the potential extent to which parents affect those decisions. In order to analyze the patterns in the data, and to assess the relationship between these factors and other school characteristics such as financial status, teacher absenteeism, or test scores, it is useful to derive summary aggregate variables. This section describes how these summary measures, used elsewhere in the report, are calculated. In addition it provides summary statistics of these measures.

School "autonomy"

The summary measure of school "autonomy" is derived from the variety of questions about who has the most say in various decisions that affect schools. The measure is constructed as a simple average of whether or not the person with the most say in each of the 21 areas is at the "school level" or not. For example, if the response to "who has the most say in determining what teaching methods to use" is the head teacher this counts as school level, but if the response is Provincial Education Advisor the response is counted as non-school level. Formally the responses counted as school level are: board of management, head teacher, teachers, parents/PNC; while those counted as non-school level are national government agencies, provincial government agencies, district/LLG government agencies, inspectors, church agencies, politicians, donors, private businesses, and other.

The responses from the head teacher, grade 5 teacher, or the BOM representative could be used to construct the measure. Because of the more limited coverage of the grade 5 and BOM representative surveys, the average response for head teachers is the main variable used. On occasion the average across all three is used, as is the average for grade 5 teachers alone (since they provide a view "from the classroom," that is a view closely related to the way decision-making is perceived by those who actually interact with students). In those cases, however, the number of schools included in the analysis falls.

Table A5.1 shows the percent of respondents who report that the person with the most say is at the school level. The average across all questions for a given respondent gives a "raw" average. This is then divided by the standard deviation in order to yield a

"normalized" measure of autonomy. Its interpretation is therefore in terms of standard deviations, that is, a one unit increase in the normalized measure of autonomy is equivalent to a one standard deviation increase in the raw measure of autonomy. Since the measure of autonomy has no intrinsic metric the normalized measure is what is ultimately used in this report. Similarly, the average across all respondents can be normalized (as reported in the last column of Table A5.1) for all valid observations.

Table A5.1: Proportion of respondents who say that the person who has the most say is at the "school level"

	Head Teacher	Grade 5 Teacher	BOM represent ative	All
Appointing teachers	0.067	0.119	0.207	0.130
Policy for assessing teachers	0.306	0.307	0.349	0.321
Assessing teachers	0.461	0.474	0.423	0.452
Teacher promotion	0.232	0.161	0.291	0.230
Discipline action against teachers	0.296	0.454	0.487	0.409
Dismissing a teacher	0.155	0.228	0.409	0.264
Selection for inservice	0.193	0.358	0.389	0.310
Who enrols	0.871	0.857	0.879	0.870
Class size	0.752	0.666	0.729	0.718
Teaching methods	0.517	0.515	0.568	0.534
Assessing students	0.908	0.907	0.882	0.899
Policy for assessing students	0.793	0.789	0.640	0.739
Spending school subsidy	0.941	0.944	0.921	0.935
Level of project fees	0.685	0.720	0.816	0.740
How to spend project fees	0.966	0.973	0.958	0.965
Maintenance provision	0.956	0.954	0.950	0.953
Constructing classrooms	0.930	0.909	0.883	0.907
Upgrading school	0.344	0.363	0.390	0.366
Organising pnc activities	0.991	0.971	0.958	0.973
Organising community activities	0.965	0.937	0.926	0.944
Organising fundraising activities	0.975	0.970	0.970	0.972
Average	0.634	0.647	0.668	0.658
Standard deviation	0.154	0.161	0.178	0.120
Minimum	0.000	0.000	0.000	0.238
Maximum	1.000	1.000	1.000	0.937
Normalized average	4.110	4.020	3.763	5.486
Normalized standard deviation	1.000	1.000	1.000	1.000
Normalized minimum	0.000	0.000	0.000	1.984
Normalized maximum	6.486	6.211	5.633	7.802

Source: PESD 2002. Percent of valid responses.

How does the summary measure of autonomy vary across the sample of schools? Respondents in NCD clearly feel more autonomous than those in other parts of the country (Table A5.2). Beyond that, however, there is not much significant variation across provinces (As is clear from Figure A5.1). Perhaps surprisingly, respondents in extremely remote locations tend to feel like they have less autonomy—despite the lack of

direct and continuous supervision. Neither poverty nor agency type are systematically associated with the summary measure of autonomy.

	Head teachers		Grade 5 teachers		BOM representative		All respondents	
Table A5.2: Average autonomy – for each respondent type and overall.								
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Province								
EHP	4.36	0.72	4.11	0.56	3.76	1.05	5.68	0.70
ENBP	4.28	0.75	4.35	0.91	3.69	0.84	5.57	0.74
Enga	4.08	0.79	4.01	0.72	3.97	0.62	5.45	0.52
Gulf	4.30	0.94	3.22	1.72	3.73	1.20	5.32	1.14
Morobe	3.76	1.43	3.88	1.21	3.36	1.09	5.10	1.43
NCD	4.91	0.83	4.70	0.92	4.56	0.89	6.42	0.85
Sandaun	4.03	0.86	3.82	0.76	3.91	0.82	5.35	0.86
WNBP	4.00	0.89	4.28	0.93	4.13	1.15	5.97	0.90
Remoteness								
Easy access	4.05	1.23	3.96	1.25	3.55	1.14	5.12	1.53
Accessible	4.20	0.88	4.19	0.76	3.98	1.03	5.72	0.81
Remote	4.10	1.11	4.01	1.17	3.69	0.98	5.51	0.95
Extremely remote	4.02	0.90	3.71	0.87	3.63	0.86	5.19	0.93
Poverty								
Better off	4.26	0.96	4.53	0.86	3.89	0.89	5.98	0.86
NotPoor	4.21	0.77	4.17	0.68	3.73	0.83	5.45	0.72
Poor	4.02	1.17	3.79	1.10	3.65	1.20	5.39	1.07
VeryPoor	4.03	0.93	3.73	1.02	3.86	0.89	5.23	1.13
Agency								
Government	4.15	0.85	4.01	0.97	3.71	1.07	5.50	0.86
Catholic	4.10	0.92	4.16	0.79	3.89	0.91	5.57	0.86
Others	4.03	1.36	3.91	1.21	3.74	0.96	5.37	1.35
Total								
	4.11	1.00	4.02	1.00	3.76	1.00	5.49	1.00

Source: PESD 2002. Percent of valid responses.

Figure A5.1: Average autonomy as reported by head teachers
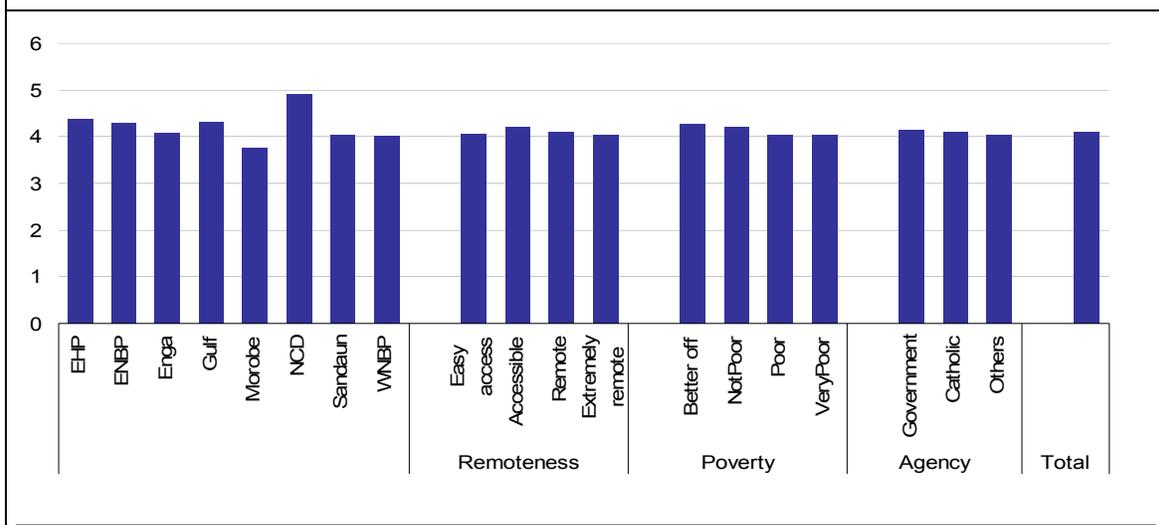
Source: PESD 2002. Percent of valid responses.

Parent participation and community partnership

Like the summary measure of school autonomy, a single average capturing the extent to which parents and communities participate in school affairs can be constructed. Table A5.3 reports summary statistics on the individual variables that make up the two sub-measures, which are then averaged and normalized to form an overall aggregate measure. Details on the individual variables are discussed above. The aggregate measure has a mean of 2.687 (with a standard normalized deviation to 1).

	Mean	Std. Dev.
Table A5.3: Proportion of respondents who say that the person who has the most say is at the "school level"		
Parent participation		
PNC exists	0.910	0.287
PNC met more than once in 2001	0.621	0.486
Proportion of parents who attend pnc meetings	0.475	0.314
Proportion of parents who collect assessments	0.346	0.393
Proportion of parents who attend school meetings when these are called	0.503	0.327
At least one parent is identified as being on the BOM	0.925	0.264
Community partnership		
Community is used as a learning site	0.349	0.478
Community members help develop school programs acnd activities	0.600	0.491
Teachers organize community activities such as adult classes, sporting competitions	0.497	0.501
Community members teach cultural activities in the school?	0.271	0.445
School uses village land for agricultural classes	0.450	0.499
School is used for community meetings	0.634	0.483
School is used for adult classes	0.173	0.379
School is used for community sports events	0.710	0.455
Aggregate measures		
Average parent participation	0.630	0.225
Normalized parent participation	2.801	1.000
Average community partnership	0.461	0.257
Normalized average community partnership	1.791	1.000
Average normalized parent participation and community partnership	2.296	0.855
Average normalized parent participation and community partnership, normalized	2.687	1.000

Source: PESD 2002. Percent of valid responses.

Table A5.4 and Figure A5.2 reports the variation of the aggregate measure of parent participation and community partnership. There is not substantial variation in the amount of involvement. Gulf and WNBP stand out with relatively low levels, and extremely remote areas stand out with relatively high levels. However these are not large variations: the difference between the average in the province with the highest and lowest values (EHP versus Gulf) is .59, or slightly more than half a standard deviation.

Table A5.4: Average parent participation and community partnership

	Mean	Std. Dev.
Province		
EHP	2.70	0.79
ENBP	2.67	0.97
Enga	2.93	0.96
Gulf	2.34	0.82
Morobe	2.75	1.33
NCD	2.61	0.75
Sandaun	2.75	0.74
WNBP	2.53	1.11
Remoteness		
Easy access	2.83	0.96
Accessible	2.59	0.84
Remote	2.45	1.20
Extremely remote	3.15	0.76
Poverty		
Better off	2.86	1.10
Not Poor	2.56	0.93
Poor	2.62	1.07
VeryPoor	2.75	0.83
Agency		
Government	2.72	0.87
Catholic	2.65	0.86
Others	2.65	1.34
Total		
	2.69	1.00

Source: PESD 2002. Percent of valid responses.

Figure A5.2: Average parent participation and community partnership
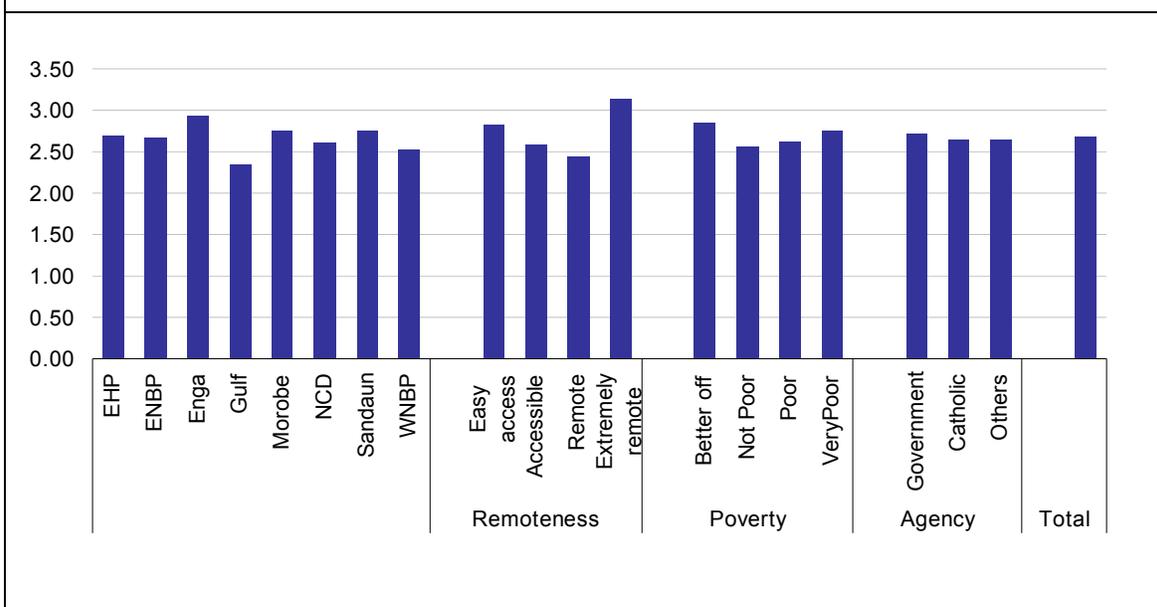
Source: PESD 2002.

ANNEX 6: ADDITIONAL TABLES ON SCHOOL FINANCES

Table A6.1: Correlates of complete school-level financial information: probit regressions

	Complete information on both revenues & spending (0/1) a/			
Poverty rate (0 to 1)	0.037	0.053	0.016	-0.057
	(0.13)	(0.17)	(0.09)	(0.32)
Remoteness index (0 to 1)	-0.035	0.05	0.037	0.076
	(0.09)	(0.11)	(0.10)	(0.18)
Primary school (0/1)	-0.023	-0.096	-0.104	-0.133
	(0.21)	(0.65)	(0.92)	(1.02)
Church operated school (0/1)	0.112	0.15	0.056	0.082
	(1.41)	(1.77)	(0.73)	(0.99)
EHP	**0.582**	**0.509**		
	(4.38)***	(2.85)***		
ENBP	**0.422**	0.427		
	(2.34)**	(1.85)		
Enga	**0.416**	0.198		
	(2.46)**	(0.87)		
Gulf	0.359	0.285		
	(1.50)	(1.04)		
Morobe	0.117	-0.011		
	(0.67)	(0.05)		
Sandaun	0.243	0.146		
	(0.97)	(0.50)		
WNBP	0.062	0.076		
	(0.38)	(0.37)		
Parent and community involvement (0 to 1)	0.110	0.073	0.100	0.07
	(1.02)	(0.64)	(0.92)	(0.65)
School Autonomy (0 to 1)	0.06	0.052	0.085	0.097
	(1.00)	(0.91)	(1.15)	(1.57)
School Autonomy* Parent & community (0 to 1)	-0.025	-0.018	-0.031	-0.03
	(1.16)	(0.78)	(1.33)	(1.35)
Head teacher absent (0/1)	-0.375	-0.3	-0.344	-0.239
	(0.76)	(0.44)	(0.60)	(0.29)
Male head teacher (0/1)	**-0.348**	**-0.439**	**-0.286**	**-0.395**
	(2.08)**	(2.31)**	(1.92)*	(2.52)**
Less than 2yrs as headteacher at this school (0/1)	**-0.183**	**-0.227**	**-0.158**	**-0.208**
	(2.56)**	(2.54)*	(2.13)**	(2.31)**
Head teacher age	-0.014	0.004	-0.004	0.014
	(0.31)	(0.09)	(0.08)	(0.29)
Head teacher age-squared	0.000	0.000	0.000	0.000
	(0.26)	(0.19)	(0.00)	(0.40)
Head teacher wants to stay at this school (0/1)	**0.233**	**0.315**	**0.188**	**0.237**
	(2.77)***	(3.09)***	(2.28)**	(2.45)**
MP from local area (0/1)	0.105	0.127	0.095	0.146
	(0.92)	(1.05)	(0.87)	(1.23)
Log of total enrolment 2001	-0.002	0.05	0.079	0.111
	(0.02)	(0.55)	(1.44)	(1.50)
# of inspector visits in 2001	0.023	0.006	0.005	-0.019
	(0.77)	(0.22)	(0.16)	(0.64)
# of BOM meetings in 2001	-0.007	-0.021	0.005	-0.008
	(0.42)	(1.05)	(0.29)	(0.44)
One account only (0/1)		0.127		0.138
		(1.23)		(1.51)
At least one joint account (0/1)		**0.194**		**0.196**
		(2.12)**		(2.22)**
Observations	204	187	204	187
Pseudo R-squared	0.23	0.23	0.15	0.20

Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%
0/1 indicates a binary variable. a/ reports marginal effects of variables rather than the probit coefficients.
Source: 2002 PESD.

Table A6.2: Regressions: grant revenue per student in 2001

	Government grant		Non-government grant			Donors grant	
	(II)	(II)	(III)	(IV)	(V)	(VI)	(VII)
	Probability grant > K50	Log of amount	Probability grant > K50	Log of amount	Log of amount	Log of amount	Log of amount
Poverty rate (0 to 1)	0.291	1.562	0.181	1.389	0.416	-0.780	0.516
	(1.34)	(1.12)	(0.75)	(1.58)	(0.31)	(0.93)	(0.44)
Remoteness index (0 to 1)	0.016	0.837	-0.109	-0.011	-1.272	0.943	-0.601
	(0.06)	(0.56)	(0.37)	(0.01)	(0.90)	(0.71)	(0.48)
Church operated school (0/1)	-0.002	-0.276	-0.022	0.117	0.197	-0.262	-0.098
	(0.05)	(0.91)	(0.42)	(0.39)	(0.68)	(0.92)	(0.39)
Primary school (0/1)	0.066	**0.559**	**0.259**	**1.184**	**1.257**	**1.025**	**1.081**
	(1.24)	**(1.77)***	**(3.91)*****	**(3.8)*****	**(4.16)*****	**(3.44)*****	**(4.08)*****
EHP	**0.423**	-0.760	**0.356**		0.105		0.240
	(2.64)***	(0.70)	**(3.26)*****		(0.10)		(0.27)
ENBP	**0.359**	-0.460			-0.401		-1.396
	(2.23)**	(0.40)			(0.36)		(1.44)
Enga	**0.770**	0.943	**0.307**		-0.780		-0.858
	(4.64)***	(0.85)	**(2.94)*****		(0.74)		(0.93)
Morobe	**0.576**	-0.132	**0.542**		1.050		**1.747**
	(3.44)***	(0.12)	**(4.41)*****		(0.98)		**(1.77)***
WNBP	**0.544**	0.407			-0.346		1.092
	(2.64)***	(0.37)			(0.33)		(1.16)
Gulf		-0.486	**0.601**		1.415		-0.927
		(0.41)	**(3.95)*****		(1.25)		(0.86)
Sandaun		-1.430	**0.459**		0.589		-0.568
		(1.11)	**(2.66)*****		(0.48)		(0.62)
Constant		0.954		**1.027**	1.408	**0.962**	1.014
		(0.88)		**(1.95)***	(1.37)	**(1.91)***	(1.12)
Observations	168	168	168	168	168	168	168

Note: Based on 174 schools .
Robust z statistics in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%
Source: 2002 PESD.

Table A6.3: Correlates of revenue per student: OLS regressions

	Log of per stundent total revenue 2001		Log of per student non-grant revenue 2001		Log of per student grant revenue 2001	
Poverty rate (0 to 1)	0.596	-0.276	0.444	-0.666	1.917	**0.959**
	(0.43)	(0.39)	(0.68)	(1.14)	(1.67)	**(1.88)***
Remoteness index (0 to 1)	0.634	0.891	-0.769	-1.052	-2.432	-2.332
	(0.39)	(0.61)	(0.55)	(0.70)	(1.24)	(1.29)
Primary school (0/1)	0.66	**0.916**	**0.857**	**0.714**	**1.144**	**1.312**
	(1.19)	**(2.12)***	**(2.16)***	**(2.21)***	**(2.21)***	**(2.72)***
Church operated school (0/1)	0.053	-0.006	0.206	0.074	-0.373	-0.374
	(0.14)	(0.01)	(1.04)	(0.31)	(0.96)	(0.98)
EHP	-0.947		**-1.227**		0.584	
	(1.58)		**(3.70)***		(0.66)	
ENBP	-0.435		-0.804		0.153	
	(0.74)		(1.70)		(0.22)	
Enga	**-1.042**		**-1.453**		0.761	
	(2.48)*		**(4.39)***		(1.04)	
Gulf	-0.629		**-2.246**		**1.592**	
	(0.98)		**(5.40)***		**(2.11)***	
Morobe	-0.783		**-1.638**		0.862	
	(1.31)		**(3.54)***		(1.13)	
Sandaun	**-1.391**		**-2.076**		0.271	
	(2.03)*		**(4.85)***		(0.30)	
WNBP	-0.672		-1.258		0.851	
	(1.24)		(1.68)		(1.23)	
Parent and community involvement (0 to 1)	0.122	0.065	**1.854**	**1.924**	-0.005	0.034
	(0.19)	(0.11)	**(1.82)***	**(2.18)***	(0.01)	(0.07)
School Autonomy (0 to 1)	-0.203	-0.27	1.038	1.035	**-0.783**	**-0.782**
	(0.40)	(0.61)	(1.52)	(1.77)	**(2.04)***	**(2.05)***
School Autonomy* Parent & community (0 to 1)	-0.018	0.008	**-0.412**	**-0.417**	0.179	0.166
	(0.11)	(0.05)	**(1.78)***	**(2.01)***	(1.28)	(1.19)
Head teacher absent (0/1)	-7.709	-7.797	-2.893	-4.004	**-12.838**	**-11.457**
	(1.52)	(1.63)	(0.60)	(0.90)	**(2.65)***	**(2.32)***
Male head teacher (0/1)	0.038	-0.018	0.179	-0.083	-0.346	-0.031
	(0.06)	(0.03)	(0.51)	(0.18)	(0.41)	(0.04)
Less than 2yrs as headteacher at this school (0/1)	0.012	0.006	-0.101	0.018	-0.024	-0.11
	(0.03)	(0.02)	(0.30)	(0.05)	(0.05)	(0.25)
Head teacher age	-0.42	-0.408	-0.145	-0.168	**-0.663**	**-0.625**
	(1.63)	(1.72)	(0.64)	(0.79)	**(2.92)***	**(2.73)***
Head teacher age-squared	0.005	0.005	0.002	0.002	**0.008**	**0.008**
	(1.63)	(1.72)	(0.60)	(0.74)	**(3.05)***	**(2.89)***
Head teacher wants to stay at this school (0/1)	0.408	0.209	-0.241	-0.447	0.249	0.412
	(0.79)	(0.43)	(0.61)	(1.19)	(0.45)	(0.79)
MP from local area (0/1)	0.103	0.063	0.104	0.06	-0.266	-0.31
	(0.33)	(0.23)	(0.56)	(0.31)	(0.82)	(1.03)
Log of total enrolment 2001	-0.156	-0.305	-0.369	-0.145	-0.548	**-0.796**
	(0.32)	(0.85)	(1.35)	(0.70)	(1.11)	**(2.08)***
# of inspector visits in 2001	0.177	0.188	-0.078	-0.055	**0.267**	**0.247**
	(1.28)	(1.67)	(0.66)	(0.54)	**(2.27)***	**(2.18)***
# of BOM meetings in 2001	0.121	0.109	**0.179**	**0.196**	**0.263**	**0.262**
	(1.59)	(1.48)	**(2.35)***	**(2.28)***	**(2.77)***	**(2.97)***
Observations	85	85	90	90	166	166
R-squared	0.38	0.35	0.50	0.39	0.32	0.29

Note: Robust z statistics in parentheses* significant at 10%; ** significant at 5%; *** significant at 1%
0/1 indicates a binary variable
Source: 2002 PESD.

ANNEX 7: ADDITIONAL TABLES ON TEACHERS AND STUDENTS

Table A7.1 : Probit regressions : marginal effects (z-stats in parenthesis) of variables on teacher absence

	(I) All teacher	(II) Male teachers	(III) Female teachers
Female (0/1)	-0.015		
	(0.75)		
Age: 31-40yrs	0.005	0.015	0.001
	(0.18)	(0.36)	(0.03)
Age: 41-50yrs	-0.033	0.003	**-0.068**
	(1.13)	(0.08)	**(2.20)****
Age > 50yrs	0.025	0.007	**0.216**
	(0.58)	(0.15)	**(2.67)*****
Head teacher (0/1)	-0.057	-0.069	-0.032
	(1.71)	(1.70)	(0.53)
Teaching level 3	-0.009	-0.008	-0.030
	(0.34)	(0.25)	(1.13)
Teaching level 4 & above	0.033	0.038	**-0.071**
	(0.79)	(0.75)	**(2.07)****
% with school housing	0.077	**0.137**	-0.026
	(1.62)	**(2.60)*****	(0.48)
Poverty rate (0 to 1)	0.150	0.190	-0.005
	(1.59)	(1.62)	(0.06)
Remoteness index (0 to 1)	0.149	-0.034	**0.410**
	(1.12)	(0.23)	**(2.57)*****
Primary school (0/1)	-0.044	-0.017	**-0.112**
	(1.42)	(0.51)	**(2.60)*****
Church operated school (0/1)	-0.012	-0.033	0.019
	(0.53)	(1.17)	(0.71)
EHP	**-0.079**	**-0.084**	-0.067
	(2.04)*	**(2.05)****	(1.53)
ENBP	**-0.104**	**-0.136**	-0.071
	(2.57)*	**(3.42)*****	(1.43)
Enga	-0.048	-0.047	-0.040
	(1.08)	(0.97)	(0.83)
Gulf	-0.053	-0.061	-0.037
	(1.01)	(1.21)	(0.53)
Morobe	**-0.116**	**-0.133**	**-0.085**
	(2.72)**	**(2.78)*****	**(2.06)****
Sandaun	**-0.132**	**-0.138**	**-0.097**
	(3.26)**	**(2.69)*****	**(2.57)*****
WNBP	**-0.109**	**-0.108**	**-0.100**
	(2.56)*	**(2.05)****	**(2.35)****
Advance notice of school visit			
… one week or less (0/1)	-0.002	0.017	-0.042
	(0.07)	(0.57)	(1.20)
… more than one week (0/1)	0.046	0.034	0.072
	(1.11)	(0.77)	(1.29)
Payment delay (days)	0.002	**0.004**	-0.003
	(1.87)	**(3.26)*****	(1.02)
Parents & community involvement	**-0.036**	-0.022	**-0.045**
	(2.34)*	(1.31)	**(2.88)*****
School autonomy	0.007	-0.005	**0.023**
	(0.58)	(0.30)	**(1.96)***
Observations	1742	909	833

Note: The regressions also includes dummy variables to control for missing data on teachers' age, teaching level, notice of school visit, payment delay, per student textbooks.
Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%
Source: PESD 2002.

Table A7.2 : Teachers' salary payment and monetary allowances in 2002

	Salary payment		Monetary allowance		
	Average fornight gross salary (kina) a/	Average fornight reduction from salary (kina) a/	% of teachers received additional monetary allowance	additional monetary allowance average teacher received (per year, kina) b/	additional monetary allowance received (per year, kina) c/
	198 schools	198 schools			
By province					
Eastern Highlands	427	135	57	90	158
East New Britain	440	153	21	96	454
Enga	454	125	49	407	824
Gulf	426	180	37	83	224
Morobe	443	168	62	109	175
NCD	457	182	54	332	618
Sandaun	413	133	28	75	268
West New Britain	422	98	24	323	1,323
By remoteness					
Easy access	440	152	49	176	357
Accessible	435	134	39	166	421
Remote	436	154	44	305	686
Extremely remote	432	132	47	107	231
By poverty					
Well off	438	161	46	223	481
Not poor	454	149	43	258	606
Poor	428	129	47	165	350
Very poor	419	134	35	102	292
By school type					
Community	431	140	52	128	246
Primary	439	145	39	230	589
By agency					
Government	435	141	46	190	416
Church	438	146	41	200	490
Total	436	143	44	194	443

Note: a/ 3 teachers were selected from each sample school for an in-depth study (survey data)
b/ include zero amount. (allowance>=0)
c/ exclude zero amount. (allowance> 0)
Source: 2002 PESD and NDOE payroll data.

Table A7.3 : Teachers' salary payment, access and delays

	Salary payment				
	Salary payment delay (incl. Zeros, days)	Average salary payment delay (days) [a/]	Average Salary access delay period (weeks)	% of teachers paid by cheques	% of teachers paid by direct deposits
By province					
Eastern Highlands	1	14	1.0	6	94
East New Britain	1	29	1.2	9	91
Enga	1	24	0.6	13	87
Gulf	11	52	0.7	25	75
Morobe	7	29	1.1	9	91
NCD	0	2	0.5	5	95
Sandaun	12	14	1.0	97	3
West New Britain	1	11	1.0	11	89
By remoteness					
Easy access	1	9	0.6	8	92
Accessible	3	19	0.9	17	83
Remote	5	29	1.1	28	72
Extremely remote	9	22	1.2	33	67
By poverty					
Well off	4	31	0.8	12	88
Not poor	1	17	0.8	10	90
Poor	2	22	0.9	10	90
Very poor	9	15	1.4	65	35
By type					
Community	6	22	1.2	28	72
Primary	2	20	0.7	15	85
By agency					
Government	3	23	0.8	15	85
Church	4	19	1.1	27	73
Total	3	21	0.9	19	81

Note: a/ includes only teachers who answered there is some delay in salary payments.
Source: 2002 PESD.

Table A7.4 : Allowances the teachers were eligible for but did not receive in 2001

	%of teachers did not receive allowances which they were eligible for	Type of allowances teachers did not receive		
		responsibility or/and disadvantaged school or/and multigrade or/and housing	Higher duty	Mining or leave fare or domestic market
By province				
Eastern Highlands	53.1	51.8	0.0	1.4
East New Britain	23.9	23.9	0.0	0.0
Enga	54.7	41.1	8.3	5.3
Gulf	43.3	36.7	6.6	0.0
Morobe	37.9	29.8	7.1	0.0
NCD	23.8	10.9	5.1	7.9
Sandaun	72.1	59.8	9.1	3.2
West New Britain	35.1	32.1	3.0	0.0
By remoteness				
Easy access	25.8	14.7	7.5	3.7
Accessible	49.8	44.8	2.8	2.2
Remote	49.5	42.3	4.5	2.1
Extremely remote	47.5	44.6	2.9	0.0
By poverty				
Well off	35.0	24.6	5.9	4.0
Not poor	56.3	49.4	4.9	2.0
Poor	28.3	25.1	1.6	1.5
Very poor	65.3	56.3	6.9	2.1
By type				
Community	55.8	50.0	4.7	0.8
Primary	36.9	29.6	4.1	3.1
By agency				
Government	41.5	34.5	5.1	1.9
Church	47.0	40.6	3.1	3.0

Source: 2002 PESD.

Table A7.5 : Correlation matrix : Ghost teacher rate, teacher absent rate, teacher shortage rate, teacher turnover rate and student teacher ratio, 2002

	Ghost teacher rate	Teacher absent rate	Teacher shortage rate	Teacher turnover rate	Student teacher ratio
Mean level	14.74	15.06	62.24	39.65	37.80
Teacher absent rate	-0.14 (0.05)	1.00			
Teacher shortage rate	-0.12 (0.08)	0.25 (0.00)	1.00		
Teacher turnover rate	0.06 (0.37)	-0.04 (0.56)	0.17 (0.01)	1.00	
Student teacher ratio	0.26 (0.00)	-0.03 (0.69)	0.07 (0.31)	0.03 (0.64)	1.00

Source: 2002 PESD.