

Supplementary Materials: Dry Pipes: Associations between Utility Performance and Intermittent Piped Water Supply in Low and Middle Income Countries

Jessica Kaminsky, Emily Kumpel

Table S1. Analysis of additional variables in IBNET dataset not discussed in this manuscript. Includes variable number and names as used in the IBNET database (ib-net.org), number of observations (n), the p value (p), the relative risk ratio (RR), and an interpretation of the results.

IBNET Variable	IBNET Variable Name	p ¹	RR	n	What is Associated with Intermittent Supply?
Raw data					
3a	Type of Service Provider [Municipal Company vs. Regional Company]	0.000**	>1	2072	Selecting <i>Regional Company</i> instead of Municipal Company
30.02	Electricity Consumption-Water	0.283	-	1339	-
32a	Type of Service [Water Only vs. Water & Wastewater]	0.005*	<1	1943	Selecting <i>Water Only</i> instead of Water & Wastewater
32b	Nature of Service Area [Urban vs. Urban/Rural Mix]	0.045*	<1	2076	Selecting <i>Urban</i> instead of Urban/Rural Mixed
34	Number of Towns Served with Water	0.223	-	1977	-
36a	Total Number of Staff-Water	0.000**	<1	710	Fewer <i>Total Number of Staff-Water</i>
40a	Population Served-Direct Supply & Shared Taps	0.001*	<1	735	Lower <i>Population Served-Direct Supply & Shared Taps</i>
54a	Length of Network Renewed During the Year	0.641	-	458	-
60	Number of Pipe Breaks	0.749	-	741	-
63	Required Number of Tests of Treated Water for Residual Chlorine	0.016*	<1	469	Lower <i>Required Number of Tests of Treated Water for Residual Chlorine</i>
64	Number of Tests of Treated Water for Residual Chlorine Carried Out	0.715	-	609	-
65	Number of Tests of Treated Water for Residual Chlorine that Passed the Relevant Standard	0.674	-	602	-
90c	Total Water Operating Revenues	0.056	-	1763	-
96	Labor Costs	0.319	-	2016	-
99	Contracted Out Services Costs	0.992	-	1724	-
112a	Total Gross Fixed Assets Including Work in Progress	0.847	-	484	-

IBNET Variable	IBNET Variable Name	p ¹	RR	n	What is Associated with Intermittent Supply?
113a	-Water Depreciation of Fixed Assets	0.797	-	386	-
114	-Water Total Debt Service	0.674	-	474	-
115	New Investments of the Year	0.505	-	412	-
120	Year End Accounts Receivable	0.48	-	1720	-
123	Staff Women Costs	0.08	-	59	-
140	Posted Tariff Water Per m ³ - Population	0.832	-	602	-
141	Posted Tariff Water per m ³ - Other Consumers	0.368	-	500	-
142	Posted Tariff Water of Public Points per m ³	0.345	-	347	-
146a	Fixed Charge per Month for Water Services for Residential Customers	0.928	-	436	-
147	Connection Charges-Water	0.419	-	491	-
HR.1	The management of your utility undertakes a skills and training strategy for all staff?	0.212	-	489	-
HR.2	The management of your utility undertakes an annual appraisal and target setting system for managers? [Yes; No]	0.004*	>1	507	Selecting <i>Yes</i>
HR.3	The management of your utility undertakes an annual appraisal and target setting system for all staff? [Yes; No]	0.012*	>1	487	Selecting <i>Yes</i>
HR.4	The management of your utility has a reward and recognition programme for all staff? [Yes; No]	0.02*	<1	486	Selecting <i>No</i>
HR.5	The management of your utility has the ability to recruit and dismiss staff (within an agreed plan)? [Yes; No]	0.002*	<1	509	Selecting <i>No</i>
P5	What best describes the utility's planning process? [Only Next Year's Budget vs. Budget and 3-5 Year Plan]	0.003*	>1	426	Selecting <i>Budget and 3-5 Year Plan vs. Only Next Year's Budget</i>
Indicators					
C4	What would be the monthly water bill for a household	0.267	-	538	-

IBNET Variable	IBNET Variable Name	p ¹	RR	n	What is Associated with Intermittent Supply?
	consuming 6m ³ of water per month through a household or shared yard tap (but excluding the use of standposts)?				
C3	Does the utility offer a flexible/amortized repayment option to spread the costs of connection to the water and/or sanitation network?	0.573	-	496	-
C1	Does the utility offer more than one level of service for household or shared water supplies (excluding free standpipes)?	0.502	-	498	-
C5.6	Do you have a call center?	0.243	-	443	-
F.1	Grants or government transfers to the utility	0.275	-	541	-
F.5	Does the company benefit from government loans?	0.294	-	440	-
F.6	Does the company have access and subscribed commercial loans from local banks?	0.054	-	439	-
F.7	Does the company have access and subscribed commercial loans from international banks or markets?	0.328	-	451	-
4.1	Total Water Consumption (L/person/day)	0.064	-	2097	-
4.2	Total Water Consumption (m ³ /conn/month)	0.577	-	1989	-
4.8	Residential Consumption-Connections to Main Supply	0.062	-	574	-
4.10	Residential Consumption (liters/conn/day)	0.527	-	1654	-
9.1	Pipe Breaks (breaks/km/year)	0.023	>1	739	Higher Pipe Breaks
9.7	Utility Performance (WUPI) (performance score; higher scores mean better practices)	0.000**	<1	1393	Lower <i>x97utilityperformancewupi</i>
9.8	Apgar Standard	0.103	-	1348	-
11.4	Operational Cost Split-% Water (%)	0.000**	>1	1764	Higher Operational Cost Split-% Water
12.1	Staff Water per 1000 Water Connections	0.071	-	621	-
12.3	Staff Water per 1000 Water Population Served	0.053	-	723	-
12.7	Staff, % Water (%)	0.801	-	706	-

IBNET Variable	IBNET Variable Name	p ¹	RR	n	What is Associated with Intermittent Supply?
12.9	Revenue per staff (US\$/Year Revenue per Staff-Member)	0.933	-	1982	-
12.10	Average Annual Salary Units (US\$/Year Average Salary)	0.231	-	635	-
13.1	Labor Costs vs. Operational Costs	0.373	-	1977	-
14.1	Contracted Out Service Costs as Percentage of Operational Costs	0.285	-	1661	-
15.1	Continuity of Service (hrs/day)	0.000**	<1	2080	Lower <i>Continuity of Service</i>
15.2	Customers with Discontinuous Supply	0.219	-	1246	-
15.3	Quality of Water Supplied: Number of Tests for Residual Chlorine (% of required)	0.346	-	363	-
15.4	Quality of Water Supplied: Samples Passing on Residual Chlorine (%)	0.567	-	476	-
18.3	Average Revenue-Water Only (USD/m ³ water sold)	0.612	-	1771	-
18.4	Revenue Split-% Water (% of total for water and wastewater)	0.154	-	1753	-
18.x	Cash Flow (US\$ per m ³ Residential Fixed	0.743	-	1592	-
20.3	Component of Tariff-Water (US\$/conn/yr)	0.161	-	413	-
20.5	Residential fixed component of Tariff - Water (% of average bill)	0.173	-	309	-
22.1	Connection Charge-Water (USD/connection)	0.406	-	499	-
22.2	Connection Charge-Water (% GNI/capita)	0.451	-	499	-
23.1	Collection Period (days)	0.985	-	1603	-
23.2	Collection Ratio (cash income / billed revenue as %)	0.196	-	1839	-
25.1	Debt Service Ratio (cash income / debt service * 100)	0.468	-	455	-
27.2	Gross Fixed Assets-Water (USD/water population served)	0.354	-	543	-
27.4	Water Network Renewal (% of water distribution network renewed every year)	0.67	-	441	-
27.5	Water Network Renewal	0.577	-	352	-

IBNET Variable	IBNET Variable Name	p ¹	RR	n	What is Associated with Intermittent Supply?
	(km/000 pop)				
27.6	Annual Investments (% investments over total assets)	0.637	-	362	-
30.2	Electricity Consumption per m ³ Sold (kWh/m ³)	0.056	-	128	-
30.4	Percentage of Operational Costs that are Maintenance (%)	0.356	-	128	-
30.7	Average Depreciation Ratio of Water Assets	0.643	-	127	-
30.9	Percentage of Government Transfers over Total Operating Revenues (%)	0.001*	>1	191	Higher Percentage of Government Transfers over Total Operating Revenues
99.0	Water Utility Vulnerability Index Standard (WUVI)	0.008*	>1	1396	Higher WUVI
99.1	Water Utility Vulnerability Index (5)	0.222	-	1396	-
99.2	Water Utility Vulnerability Index (7)	0.214	-	1396	-

Notes: Reference category for equation is Continuous Supply. Controls for GNI/capita and nominal service population. Includes only utilities with reported GNI/capita less than \$17,001 USD.

¹* $p < 0.05$; ** $p < 0.000$.