Water and Sanitation Privatisation in Metro Manila:
An Impact Evaluation of Service Provider Assignment on Health, Education, and Wealth Outcomes, from 1997–2007

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Abstract

A quantitative impact evaluation was performed here on the impact of the Metro Manila, Philippines, water and sanitation (WatSan) privatisation – from 1997–2007 – on the health, education, and wealth of its population, using national survey data. The case study is interesting because of its quasi-experimental nature, as the metropolis was split in half during this 1997 privatisation and each half was awarded to a different company (Manila Water and Maynilad). For the next ten years, Manila Water performed 'well' (in terms of outputs), while Maynilad performed more poorly. Thus, the technique of difference-in-difference regression was applied to national Demographic and Health Survey (DHS) data from 1998 and 2008, to attempt to determine whether the 'better' service outputs of Manila Water had a discernible impact on the important outcomes of its population: health, wealth and education. Although the analysis suffered various methodological/technical shortcomings related to the DHS data, its results nevertheless suggested that the WatSan activities of Manila Water – compared to those of Maynilad – had a positive impact on at least the education of its population, but had little impact on health. This is likely because the companies' activities during this time period focused mainly on water supply in the absence of sanitation, with health benefits only accruing if both are provided simultaneously. An interesting sub-finding was on the impact of public taps (for low-income areas), with results suggesting that these taps can provide substantial economic (wealth / education) benefits, but also substantial health risks.

Introduction

Numerous studies have quantified the high benefit-to-cost ratios of water and sanitation (WatSan) service provision in urban areas. Individual WatSan interventions, though, are increasingly being questioned on what their actual, specific impact was on their recipient population. This relates to the growing discipline of quantitative impact evaluation (QIE), whose methods are increasingly being applied to WatSan projects/technologies, often in a randomised controlled trial (RCT) setting. However, the majority of WatSan interventions undertaken to date have not used RCTs, though decision-makers might still be interested in determining their impact. Yet, there are to date only a few QIEs of 'natural' WatSan projects like these (e.g. Jalan & Ravallion 2003, Galdo & Briceno 2005), whose evidence base could help inform better project planning and implementation for decision-makers.

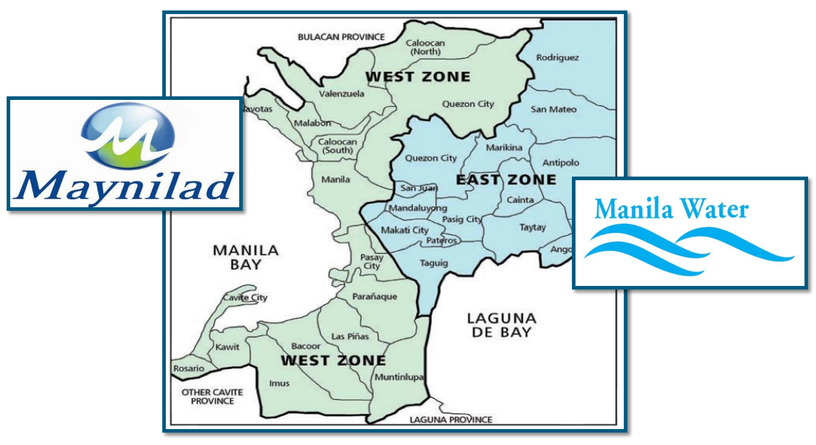

Figure 1. *A map of the post-1997 Metro Manila WatSan service zones. Image from Chiplunkar* et al. *(2008, p. 1)*

This was thus undertaken here, to perform a QIE of a relevant WatSan intervention, so as to contribute evidence on how the success or failure to meet project outputs can impact on the lives of its recipients. Metro Manila served as the relevant case study. In 1997, the metropolis underwent what was, at the time, the world's largest water privatisation. The privatisation followed the 'Paris model', whereby the metropolis was split in half and each was bid on and awarded to a different private company, in order to promote healthy competition in service delivery (Dumol 2000). The 'West Zone' of the metropolis was awarded to Maynilad Water Services Inc. and the 'East Zone' to the Manila Water Company Inc., with concession agreements due to last until 2037.

However, due to differences in acquired debt loads (and subsequent Asian financial crisis), operational strategies, and management styles, it was not long before the two concessionaires began to significantly diverge in their ability to meet their service targets (Neville 2007, Wu & Malaluan 2008). Maynilad began struggling against bankruptcy already in 2001 – with minimal new WatSan investments – until 2007, when it was finally restructured and rebid to new owners, who have since performed better in terms of meeting service targets (Chiplunkar et al. 2008). Conversely, Manila Water emerged unscathed from the financial crisis and made significant new WatSan investments during this ten-year period, especially on reducing its non-revenue water, which has greatly increased its financial health (Luz & Paladio-Melosantos 2012).

Conceptual Framework & Methodology

This 1997-2007 period poses an interesting quasi-experiment, as the poor performance of Maynilad essentially turned the West Zone into a 'control group', while the strong performance of Manila Water made the East Zone into a 'treatment group'. The question then proposed was what, if any, impact these better service outputs of Manila Water had on measurable outcomes of its East Zone population, as compared with the worse outputs of Maynilad on its West Zone population. Conveniently, there also existed national Demographic and Health Survey (DHS) data for both 1998 and 2008. From these, three outcome variables were chosen for analysis, due to their accessibility in the DHS and relevance to known impacts of WatSan: women's years of education, women's wealth index, and children's (under age 5) cases of diarrhea in the two weeks prior to the survey.

Because of the nature of this data and case study – with both baseline (1997; $t = 0$) and post-intervention (2007; $t = 1$) outcomes available for both the treatment (East) and control (West) zones – the technique of difference-in-difference (DID) regression was used. This can be modelled by:

$$Y_{i,t} = \alpha + \beta T_{i,1} t + \rho T_{i,1} + \gamma t + \epsilon_{i,t}$$

where $Y_{i,t}$ denotes the outcome variables per respondent at each time period; T_1 denotes the treatment area at $t = 1$; and the interaction coefficient β denotes the impact estimate, if various assumptions hold true. As Khandker et al. (2010) detail, the power of this method is its ability to ignore any differences between the zones that are time-invariant, though time-variant differences would bias the model unless controlled for.

The main challenge, then, was to carefully define and specify the East/West Zone populations across these two DHS. This was important so as to account for both the immigration/emigration of population across the zones during these ten years and the fact that neither zone has yet achieved 100% service coverage, meaning that some of the surveyed population would not have had service from the relevant concessionaire. The DHS data presented various shortcomings in this regard, so several assumptions were needed to isolate the populations, using data within the DHS on each respondent's location, the number of years they had lived at that address, and whether their household was served or not by piped water (a good sanitation variable was lacking). This process may have introduced error into the results, but was necessary due to lack of any better data with which to classify these populations.

Figure 2. *A line for a public tap in the early days of the Maynilad service zone. Although the piped water is likely clean coming from the tap, the area exhibits a poor standard of hygiene that could pose contamination risk. The results here found economic benefits in providing public taps like these to low-income areas, but an associated health detriment. Image from Chiplunkar* et al. *(2008, p. 2)*

Results & Discussion

This study computed various tests to arrive at its results, including DID regressions, t-tests for mean differences, and Kolmogorov-Smirnov tests for differences in distributions. The full results tables are available from the author.

The overarching trends from the various regressions are summarised in the table below, and note as well that most of these trends were further supported by the t-tests and Kolmogorov-Smirnov tests (not shown). As mentioned above, due to the DHS not specifically asking respondents whether they received Manila Water / Maynilad service or not, two different approaches were instead used to converge on the desired question. Tests were first performed using the DHS variable on presence/absence of household piped water as the explanatory variable, as displayed in the first column group below. Because of ambiguity in the nature and service provider of 'public taps' (as defined in the DHS), tests were run both including and excluding them from the 'piped water' definition. Tests were then run using the variable on residence in the East/West Zones, as displayed in the second column group below. In both cases, tests were run both with and without controls.

		Explanatory Variables for DID Regressions						
		Piped Water * Year Interaction Variable (β), Including Public Taps		Piped Water * Year Interaction Variable (β), Excluding Public Taps		East / West Zone * Year Interaction Variable (β)		Brief Interpretation of Coefficients
		Significance of the Regression Coefficients ($p < 0.10$)	*Signs on the Regression Coefficients*	*Significance of the Regression Coefficients ($p < 0.10$)*	*Signs on the Regression Coefficients*	*Significance of the Regression Coefficients ($p < 0.10$)*	*Signs on the Regression Coefficients*	
Outcome Variables	Child Diarrhea	Insignificant	Positive	Insignificant	(Mixed)	Significant	Negative	Worse health for piped water recipients; Better health for East Zone residents
	Women's Wealth	Significant	Positive	Insignificant	Positive	Insignificant	Negative	More wealth for piped water recipients; Less wealth for East Zone residents
	Women's Education	Significant	Positive	(Partially Significant)	Positive	Insignificant	Positive	More education for piped water recipients; More education for East Zone residents

Even with the shortcomings of the DHS dataset, these results nevertheless display a fairly strong series of correlations for the impact of Manila Water versus Maynilad during the ten-year period, via the positive impact of piped water service on wealth and education, the positive impact of East Zone residence on health and education, and the various similar results obtained via t-tests and Kolmogorov-Smirnov tests. The surprising result was the lack of impact of piped water service on health, potentially even being detrimental. This is supported, however, by a similar study by Bennett (2012) in Cebu, which proposed that this result is due to the provision of water supply in absence of sanitation (as was largely done by both concessionaires during the study period), with health benefits only accruing if both are provided together. The findings for public taps were also interesting, as they imply that their recipients showed positive impacts on their wealth and education, yet negative impacts on their health. As displayed in Figure 2, this could be because, while the taps provide a more convenient and lower cost water supply, their public nature makes them prone to contamination. Greater effort should thus be paid to ensuring proper hygiene awareness when supplying these taps.

In short, this study illustrates the process, challenges, and opportunities in performing QIEs of WatSan interventions, and strengthens the evidence base on how WatSan service outputs can translate into population impacts. Its key message emphasises that, if positive health impacts are desired, then WatSan providers should not forget about the 'San' in 'WatSan'.

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[1] *Note that this work was undertaken as part of the author's M.Sc. dissertation at the University of East Anglia (completed Sept. 2012), prior to employment at ODI*

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