

# The Impact of Water on Education in Nepal

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## Abstract

This paper studies the relationship between water and education for students in late primary and early secondary school in Nepal. The analysis exploits the fact that the extending access to sufficient, affordable, accessible / safe water supplies and to safe sanitation services will have a great impact on education and an even greater impact on education for girls. Information on students' residence, school location and gender of student is used to estimate the effect on student education in a difference-in-differences-in differences models specification.

## Introduction

Water is life, for people and for the planet. It is essential to the well-being of humankind and a basic requirement for the healthy functioning of all the ecosystems. The right to water is indispensable to leading a life in dignity, and is a prerequisite for the realization of other human rights. The human right to water entitles everyone to sufficient, safe, acceptable and affordable water for personal and domestic uses.

Due to extreme landscape in Nepal, it presents a range of water supply challenges: due to remote sources, contamination and dwindling supplies in urban areas. A large proportion of the Nepalese population is devoid of access to safe and adequate drinking waters. It is estimated that 80% of the total population has access to drinking water, but it is not safe. The dual aspects of the water crisis – lack of water and of sanitation – lock women in a cycle of poverty. Therefore, they cannot attend school; they cannot earn an income.

Having access to clean drinking water and sanitation is closely linked to children's education. A lack of access to clean drinking water and sanitation has severe repercussions in school attendance. Frequently, young girls are delegated this chore to collect water. They spend countless hours trying to provide this basic life necessity. All the water they need for drinking, washing, cooking and cleaning. They walk miles, carry heavy burdens, wait for hours and pay exorbitant prices. The work is back breaking and all consuming. Often the water is contaminated, even deadly. In these instances, they face an impossible choice- certain death without water or possible death from illness.

Girls also struggle most from the lack of adequate sanitation, the often-unspoken part of the water and sanitation crisis. The sanitation crisis for girls can be summed up in one word: 'dignity.' Around the world, fewer than one person in three has access to a toilet. In many countries, it is not acceptable for a girl to relieve herself during the day. They wait house for nightfall, just to have privacy. This impacts health and put their safety at risk. About half of all girls worldwide attend schools without toilets. The lack of privacy causes many girls to drop out when they reach puberty.

A possible water policy is to provide schools with piped water. In this paper, I exploit information on students' residence, school location and gender of student in a difference-in-differences-in-differences model. Examining the student attendance in late primary and early secondary school, the probability of staying in school and performance in school.

There are two important mechanisms through which piped water may increase the overall attendance in school. First, providing clean water to all students and teachers might result in better overall health. Tiny worms and bacteria live in water naturally. Most of the bacteria are harmless. But some of them can cause devastating disease in humans. And since they can't be seen, they can't be avoided. Every glass of dirty water is a potential killer and by providing clean water it unlocks potential by helping kids stay healthy so they can stay in school. The second possible mechanism is by providing proper sanitation facilities. Inadequate sanitation and lack of hygiene not only affect the health, safety and quality of life of children. They also claim the lives of an estimated 1.5 million children under the age of five who die each year from diarrhea. By providing better sanitation and hygiene services in schools reduces hygiene-related diseases. It also protests

girls' right to education as girls are reluctant to continue their schooling when toilets and washing facilities are not private, not safe, not clear or simply not available. Both mechanisms of which are of interest in this paper.

These arguments are in favor of providing water to school. It is important to note that there could be a potential spillover effect for those students who are not provided accessibility to clean water. As the number of disease/ illnesses diminish, others who are not a part of this program will also be less susceptible due to a decrease of exposure to the disease/ illness.

An empirical challenge when analyzing the effect of clean water is omitted variables. One cannot simply compare students subject to or not subject to clean water, because it would be unethical to simply not provide a student water just for this study. Also, because there could be both observable and unobservable differences in performance and attendance of a student. To control for these additional omitted factors, I perform a difference-in-difference-in-differences analysis.

## Methodology

I want to compare school attendance in villages with and without piped water, because clean water could have a great impact on education in Nepal. However, when randomizing villages to determine which school will receive piped water and which will not, the study will be conducted in rounds such that those who do not receive piped water in the first round may receive it in the next wave. For example, the rounds may be in 3 year intervals starting in the year 2000; the next round would be in 2003 and so forth. It is simply unethical to choose who gets it and who doesn't. Therefore, we will analyze the village before and after piped water.

In the baseline model, I address the omitted variable problem by using a difference-in-differences-in-differences estimation. The first difference is the difference in student attendance for the rounds with (treatment) and without (control) piped water where  $\beta_3$  is the casual effect, show in equation (1):

$$(1) \text{ attendance} = \alpha + \beta_1 \text{Treat} + \beta_2 \text{Time} + \beta_3 \text{Treat} * \text{Time} + \epsilon$$

The second difference is in student attendance for girls with (treatment) and without (control) piped water where  $\beta_3$  is the casual effect, show in equation (1)

$$(2) \text{ attendance} = \alpha + \beta_1 \text{Treat} + \beta_2 \text{Gender} + \beta_3 \text{Treat} * \text{Gender} + \epsilon$$

Thus, the third difference is the difference in school achievement between these two differences. The difference-in- differences-in- differences is shown in equation (3):

$$(1) \text{ DIDID} = \text{DID}_{\text{time}} - \text{DID}_{\text{gender}}$$

The main identifying assumptions are:

- (1) The primary identification assumption is that the result of education is not correlated with unobserved characteristics of respondents that affect trends in outcome.
- (2) The sample is balance in trends, not levels, along the distance gradient.
- (3) Controls are included for unobserved shocks that may impact individual outcomes.
- (4) Respondents that may move closer to the schools since they may more likely benefit are also noted.

## Conclusion / Notes

In this paper, I have discussed how to analyze a policy that provides schools in Nepal piped water (clean water) using a difference-in-differences-in-difference model specification. There are many papers that find that water is correlated with education. We can see that the less time spent collecting water results to

more class time. Also, that clean water and proper toilets at school means teenage girls don't have a stay at home for a week out of every month.

Something to consider is that the result of this study may only be a short-term effect. As time passes the pipes may start to rust and need replacement, the pump for the water may break, the sewage may backup, etc. Nepal is considered one of the poorest nations in the world. Which means they may not have the resources to fix this. In worst case scenario, if the technology for the water does break they will end up facing another water crisis.

## References

"Water In Crisis - Spotlight Nepal". *The Water Project*. N.p., 2016. Web. 10 Dec. 2016.

"Water Laws In Nepal". *Nepal Policy Net*. N.p., 2005. Web. 10 Dec. 2016.