

A Comparative Study on Water Conservation through Behavioral Economics based Nudging: Evidence from Indian City "A Nudge in time can save nine"

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Abstract

Indian cities are living on borrowed time. Their critical infrastructure for essentials like water is creaking and inadequate. City managers are running out of practical solutions and are losing lives to water borne disease. Thus every little of treated water becomes gold. In this context behavioral Economics provides a low cost alternative solution to save the blue gold. In this paper, we are highlighting how nudges can be implemented in the Indian cities through school children and adults for water conservation to bridge the intention and action gap. This Nudge intervention resulted in average monthly energy savings of 23.61 kwh, and 10.3 percent water saving equivalent to 9689 liters reduction in water consumption in the school children residents and apartments were approached directly were resulted of 5.02 percent equivalent to 504.68 litres. Hence the Behavioural Nudges particularly through children can provide policy makers an inexpensive and effective intervention to address the urban water conservation challenge.

Keywords: Behavioural Economics, Nudge, Water Conservation, Shut the Tap, Household, and School Children.

1. Application of nudge on water conservation in India, Why?

Indian cities are living on borrowed time. Their critical infrastructure for essentials like water is creaking and inadequate. City managers are running out of practical solutions and are losing lives to water borne disease. Thus every little of treated water becomes gold. In this context behavioral Economics provides a low cost alternative solution to save the blue gold. Providing water, sanitation and other essential services to over 120 crore people in India is a foremost confront for the government, more than ever in the urban context. Government authorities are often pilloried for the dismal state of civic amenities in the Indian cities.

In an urban context, where household water use constitutes the bulk of water? However, recent advances in applied behavioral economics suggest that these reductions in water use, while the city comparison had no discernible effect on water and out its significance both for the issue of water conservation and for urban water demand. Delhi Jal Board (DJB), Maharastra Jeevan Pradhikaran, Chennai Metro, etc are some of the utilities that were often at the receiving end of citizens' ire with complaints about poor water quality and supply. While these government utilities were criticized for the city's inadequate water infrastructure, some of this criticism may be inappropriate or misplaced. The basic water need per person is 150 litres per day while the current provision is only 105 litres per person per day in Indian cities. By 2030, this demand will shoot up to 220 litres of water per person per day (Vishwanath, 2013). Such capacities would be difficult to achieve especially when India is predicted to be a water-scarce country by 2025. This will cause severe water shortages at the current pace of capacity addition. In response to the water shortage, restaurants in Mumbai have adopted half-filled water glasses during meals and paper napkins that replace water to wash hands after meals. The coastal city of Chennai has a metropolitan population of about 10.435 million in 2017. As the city lacks a perennial water source, catering the water requirements of the population has remained an arduous task.

Although three rivers flow through the metropolitan region and drain into the Bay of Bengal, Chennai has historically relied on annual monsoon rains to replenish its water reservoirs since the rivers are polluted with sewage. With the population increasing over the decades, the city has faced water supply shortages, and its ground water levels have been depleted. Water demand for Chennai city and suburbs is about 1400-1500 mld (million litres per day) which is met out through 830 mld water supply from Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) and 570 to 670 mld gap was filled through Private tankers and bore wells. In May – June 2017, the supply from CMWSSB is about 470-500 mld (40% of this water supplied by 2 desalination plants in Minjur and Nemmeli at the rate of 100 mld per plant) due to drought earlier years.

Metro water authorities, when questioned about the severe shortage, threw their hands up and blamed the lack of monsoon rains. The above said Government water utilities also spend crores of rupees in water conservation awareness campaigns expecting reduction through optimal water usage by citizens. Also there is no mechanism to assess the impact of such programs. In this context, it is pertinent to look at a study which shows that the participants who had attended a ten days workshop on residential resource conservation showed changes in attitudes and knowledge, but no changes in behavior. (Geller, E.S, 1981)

The Behavioral Economics based nudges proved that behavioral change is possible by applying right nudge in right place at right time. It can be argued that nudges can be used for good as well as for bad purpose. In India, the government and corporate are started to practice nudges for good. Schemes such as Swachh Bharat Abhiyan and voluntary opting out of subsidy schemes are few examples. (Hindustan Times, 2015). 'Take all you can eat, but eat all you take': A loud message from TCS to its staff in their office canteen saying "yesterday's wastage was 45kgs of food which could feed 180 people" – was typical nudging for good.

We introduced and detailed a novel approach to public policy that takes cognizance of cognitive and behavioral biases that individuals often fall prey to. This approach, commonly called as 'nudging', refers to altering the decision-making environment in the context of biases and 'irrational' behavior that decision-makers often display. We have seen how countries like Israel and Singapore have benefited from interventions that target predictable behavior of individuals. In this research paper, we are highlighting how nudges can be implemented in the Indian cities through school children and adults for water conservation to bridge the intention and action gap.

2. What are nudges in Behavioral Economics?

"**Nudge** theory (or **nudge**) is a concept in **behavioral** science, political theory and **economics** which proposes positive reinforcement and indirect suggestions to try to achieve non-forced compliance to influence the motives, incentives and decision making of groups and individuals to improve the life and well being of people and society". Thaler and Sunstein (2008)

"A nudge is a technique used by choice architects in order to change someone's behaviour in a very easy and low-cost way, without reducing the number of choices available". We often see it described as "non-enforced compliance", and Thaler calls it "Libertarian paternalism" meaning preservation of liberty of citizen's choices.

Choice architects and policy makers aim to change people's behaviour and alter their decisions more effectively using a nudge rather than legislation or direct enforcement.

If policy design is thought as the map and development outcomes as the destination, then nudges can be the road signs that gently guide you towards the best route.

Nudge theory is a stretchy and up-to-the-minute thought for:

1. Understanding of how people think, makes decisions, and behaves.
2. Serving people get better their cognitive power and decisions making.

3. Applying Behavioural Economics for Water Conservation

Water Conservation by way of reduction in water use in urban areas can be done by adopting "Pecuniary or Non-Pecuniary Approaches". The Pecuniary approaches involve certain financial or tariff related measures to motivate residents in reducing their water usage and thereby conserve water. In the absence of assured and regular water supply to households, any increases of tariffs are socially and politically unacceptable. In the absence of meters for volumetric tariff, despite its shortcomings, any incentive to save water is not feasible. Similarly, despite the "economic benefits associated with efficient water management", consumers have not invested or shown interest in water efficient products and practices.

On the other end of the spectrum regulatory efforts focused on “ Rationing of water supply” try to reduce the demand supply gap, though it is critiqued for being contrary to freedom of choice. This requires policy level decisions on fixing prices for the supply of water. Similarly this approach includes providing information on water scarcity and to foster water conservation. However, studies indicate that “providing consumers with information can increase their awareness of a topic, but infrequently provides actionable knowledge and more rarely produces significant changes in behaviour”. (Ashby, et.al 2010) Similarly, in another study, the “individuals who had undergone a two and half months course on water conservation showed change in knowledge of the need to conserve water but did not display any subsequent change in water consumption patterns” . (Geller, et.al 1983)

Tamil Nadu and especially Chennai have witnessed number of government supported awareness campaigns to save water and the media has also reported on such programs However, these have mostly not made any visible impact on consumption patterns. This dichotomy was also reflected in the focus group discussions conducted as prelude to this study. (Amishi & Kanaka, 2017)

Considering the above facts, Non-Pecuniary Approaches based on simple and inexpensive behavioral interventions are chosen for this study to test their efficacy in reducing water consumption. “Non-pecuniary interventions (i.e. psychological interventions) do influence the behavior which is water conservation, with a higher effectiveness of social comparison in the group of high-use households, and a larger effect in the short-term rather than in longer periods”. (Ferrara and Miranda, et.al 2013). Also, the behaviour is influenced by considerations beyond information and financial factors.

What are the nudges implemented in the Study Area/ Chennai in India

A nudge, is any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives. In this programme, the Nudge was designed to address behavior bottlenecks, identified in consumer discussions, underlying the knowledge–action gap. The intervention involved modifying the “choice architecture” around behavioral dimensions of social norms, status quo bias and encouragement.

Tapping into the power of behavioral economics the Nudge is designed incorporate two fundamental principles.

- Pause & Think at Decision Points and
- Social Norms of being frugal & caring about others.



The intervention places 'information & reminder stickers', at points of use, in households creating Decision points. One of the biggest challenges in behavior change is addressing the attitude of discounting the future gains. When Future gains equated with the needs off-springs get valued at a much higher level and are not discounted. Similarly a three prong Nudge is also used

- Post cards highlighting both the plight of have nots in the rural country side
- Positive action of Peer Group in reducing water consumptions
- Action points on how to save water with quantification are also provided

This will attract social norms to influence entrenched behaviours to trigger pressure of social norms to change behaviours.



4.1 “Shut the Tap” Programme:

The programme was rolled out in 2 approaches, (i) Through School Children and (ii) Through the apartment residents, using the above said nudges intervention tools.

4.1.1 Approach 1: Through School Children

More than 6000 school children of 5 major schools in Chennai Metropolitan were involved. Along, with the Water conservation awareness messages, about 1,00,000 intervention tools for nudge (i.e. Information card, Reminder stickers& appeal letters) were printed and distributed through school children to reach their family members.

4.1.2 Approach 2: Through the Apartment Residents

In Chennai Metropolitan, the campaign was rolled out in the following 4 large apartments i. Arihant, Thoraipakkam , ii. L&T Eden Garden, Siruseri, iii. Atrium Apartments, Perungudi and iv. Arihant Heirloom, Navalur. More than 2,000 residents were given awareness and the nudge tools were distributed to all residents. Also, in this approach, the mobile whatsapp groups formed through which, the water conservation messages were shared. Also, painting competition and presentation on water conservation by Apartment Children were organized to get the support and acceptance of apartment residents.

Here, as well, to access the result of nudge intervention the Atrium Apartment is selected for study (purposive sampling – as every flat in this apartment has water meter), with 58 flats as treatment group and 16 flats (in a block) as control whose residents received only generic water conservation message and no nudge treatments.

2. Does our intervention give expected results?

Table 1 shows the average monthly reduction in electricity & water consumption of both treatment and control groups during the study period. The intended nudges had better impact among the children which encouraged them to influence the parents, resulted in average monthly energy savings of 23.61 kWh, 10.3 percent water saving equivalent to 9689 liters per month and the impact of another approach, i.e. Nudging the residents of apartments through adults resulted in energy saving of 1.23 kWh and 5.02 percent water saving equivalent to 504.68 liters per month. When comparing the outcome of Nudging through children and Nudging apartment residents through adults, the nudging through children outperforms the other approach showing about 20 times water saving per month.

Table 1 - Comparison of Nudging through Children and Adults

| | Energy Savings per Month (kW.h) | Water Savings per Month (000 ' LITRES) | Percentage Change |
|---------------------------------|---------------------------------|--|-------------------|
| Nudging Through Children | 23.61 | 9.69 | 10.3 |
| Nudging Through Adults | 1.23 | 0.506 | 5.02 |

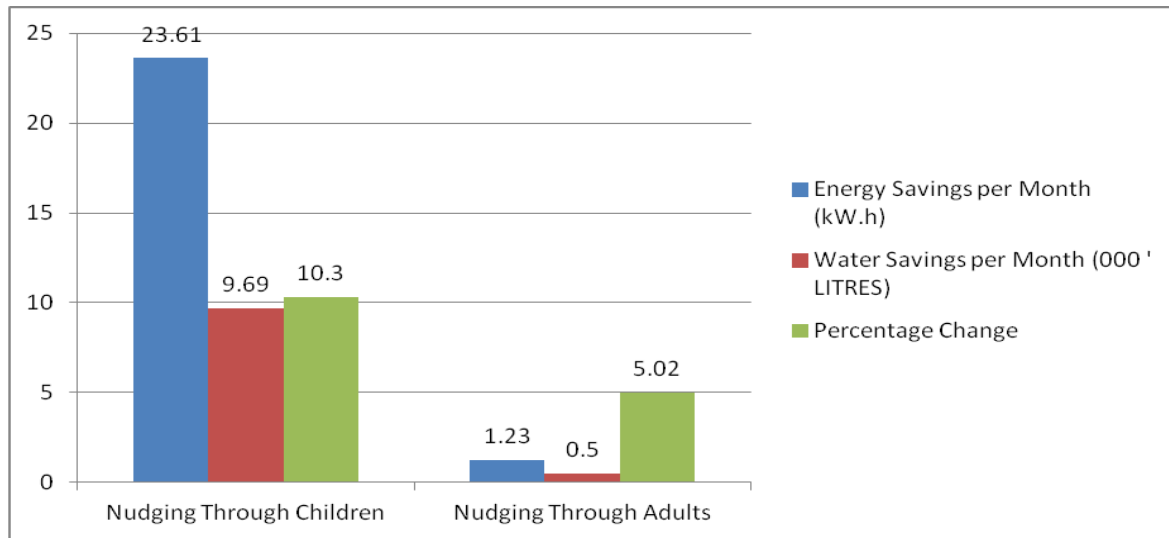


Figure: 1 Graph showing details of Energy savings by Children and adults

5. Conclusion:

The findings of this study are heartening in so far as they propose that behavioral economics interventions can beneficially enhancement the persuasion-based tools currently in use to commence this issue at the neighborhood level. Also, the study consequences designate that, of the two approaches, the intrusion through the children found to be more effective, as the percentage of savings in water through children (10.3%) is twice that of through adults in apartment (5.02%). Hence the Behavioural Nudges particularly through children can provide policy makers an inexpensive and effective intervention to address the urban water conservation challenge.

Secondly and more importantly, the study shows that behavioral nudges provide a potent alternative to policy makers to address the urban water conservation challenge, and are successful in resource and technology-constrained settings, such as in Chennai city.

Influencing the family through school children can address the behavior to discount future gains. Future gains when equated with the needs off-springs get valued at a much higher level and are not discounted. Therefore education department can add this to the syllabi with more emphasis on resource conservation especially the water besides environmental concerns like pollution. Considering the sense of conserving the scarce resource and the impact, “shut the taps theory” shall be the immediate approach.

Way at the forefront:

Eventually, the evolution of our country depends on government policies adapting and addressing the developmental challenges in front of millions of our beneficiary populace.

- The government before now uses choice interventions like subsidies and monies to contour civilian behaviour.
- Considerate cognitive biases in the approved manner and formulating interventions that take into description such biases can have a enormous collision on creation public-spending more valuable.
- As a supplementary additional benefit, India can make use of this prospect to go ahead the approach in revolutionary behavioural research in South Asia, focusing on the policy challenges exclusive to this constituency.

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