

# Knowledge, attitude and practice of water conservation methods among high school students - A cross sectional study

Uppili Venkat Ragavan M<sup>1\*</sup>, Laxman Saran<sup>2</sup>, K Yudhiesh kumar<sup>3</sup>, Varun Visakan<sup>4</sup>, Siddharth S<sup>5</sup>, Vignesh<sup>6</sup>, R Vinoth<sup>7</sup>, Hari Ram<sup>8</sup>

<sup>1</sup>Assistant Professor, <sup>2,3,4,5,6,7,8</sup>House Surgeon, Department of Community Medicine, Government Medical College and Hospital, Ommandurar Government Estate, Chennai, INDIA.

Email: [ragavanmdcm@gmail.com](mailto:ragavanmdcm@gmail.com)

## Abstract

**Background:** Water is the elixir of life. We need water for literally every purpose. Right from the cell in the body water is indispensable. It is estimated that water requirement for drinking and domestic use is around 150-200 litres per head per day. It is especially important to educate and create awareness among the public of the importance of saving water and responsible water use. **Methods:** A cross sectional study was conducted among high school students from Chennai. The data was collected using pre tested and validated questionnaire containing details of socio demographic details, knowledge, attitude and practice of water conservation methods were asked in local language. A total of 210 students were included in this study. **Results:** Around 62% of the students correctly told the source of water and more than 92 % of the students were aware of water recycling. Almost all the students were aware of rain water harvesting (99.5%) out of 82% of the students found it to be economical and 94 % of the students rightly said that this process will improve the ground water level. Boiling is the common method of purifying followed by the students at home (46%). Around 73 % of the students closes the water tap while brushing. More than 75 % of the students closes the water tap completely after using. **Conclusion:** We found from our study that the knowledge of the students about water conservation and harvesting is high so as they practice the method of water conservation in their homes, the attitude towards water conservation and harvesting is on a positive note, these students who are ambassadors of the future having a positive attitude shows that the practice of water conservation and water harvesting in future is in safe hands.

**Keywords:** Water Conservation, Water harvesting, Students, KAP.

## \*Address for Correspondence:

Dr Uppili Venkat Ragavan.M, Assistant Professor, Department of Community Medicine, Government Medical College and Hospital, Ommandurar Government Estate, Chennai, INDIA.

Email: [ragavanmdcm@gmail.com](mailto:ragavanmdcm@gmail.com)

Received Date: 03/08/2021 Revised Date: 12/09/2021 Accepted Date: 27/10/2021

This work is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/).



## Access this article online

Quick Response Code:



Website:

[www.medpulse.in](http://www.medpulse.in)

DOI:

<https://doi.org/10.26611/10112021>

## INTRODUCTION

Water is the elixir of life. We need water for literally every purpose. Right from the cell in the body water is

indispensable. It is estimated that water requirement for drinking and domestic use is around 150-200 litres per head per day.<sup>1</sup> But at present, water has become something so hard to find; it has become a depleted. At present, approximately 1.2 billion people live in areas wherein water is scarce and 1.6 billion people face economic water shortage.<sup>2</sup> Therefore, the World Health Organization, United Nations Children's Fund, various governments, and public and private sector entities have exerted intensive efforts to provide sufficient water supply to residents, particularly in rural areas and in developing countries.<sup>2</sup> Furthermore, it is expected that anthropogenic climate change will increase drought risk in many areas around the world<sup>3</sup> Typically, however, it is when a drought strikes that underlying vulnerabilities become apparent, sometimes

not allowing planners the time to respond<sup>4</sup> In fact, due to the length of the drought, many would argue that it changed the culture of water management in the country.<sup>5,6</sup> Dolnicar *et al.*<sup>7</sup> suggested that several factors affect water conservation behavior. These factors include environmental attitudes<sup>8,9</sup> and a range of demographic variables, including gender, age,<sup>10</sup> education,<sup>11</sup> and information transparency of water consumption, which is the strongest factor. An improved understanding of daily water consumption practices will encourage consumers to adopt water conservation behavior.<sup>7</sup> Studies have shown that people often have misconceptions on actual water consumption.<sup>12,13</sup> Some users tend to underestimate their water consumption.<sup>14</sup> However, studies are lacking on consumer misconceptions regarding actual water consumption on specific water-use patterns and their relation to the socio-demographic profiles of users and household conservation awareness.<sup>12</sup> There is currently acute water shortage in various parts of the world and therefore it is essential that all people are aware of the importance of saving water. It is especially important to educate and create awareness among the public of the importance of saving water and responsible water use. Students play an important role as they are the generation who are about to face huge problems regarding water shortage and therefore it is very important that they know the importance of conserving water and protecting natural resources of fresh water. Hence this study was planned to assess the knowledge, attitude and practice of water conservation methods among high school students.

## METHODOLOGY

A cross sectional study was conducted among high school students from Chennai. Prior permission was obtained from the authorities before the start of the study. The data was collected by the medical under graduate students who were trained beforehand for this purpose and it was supervised by the faculty. The data was collected using pre tested and validated questionnaire containing details of socio demographic details, knowledge, attitude and practice of water conservation methods were asked in local language. The data was collected from a school which was selected by simple random method, for this purpose all the high schools in the city limit were line listed and one school was selected randomly using lottery method and all the students in high school who were present on the day of data collection and willing to participate were included in the study. No efforts were made to collect data from the students who were absent on that day. The high school students who were willing to take part in the study was included in the study and those who were not willing to participate in the study were excluded. A total of 210 students were included in this study. The collected data

were then entered in MS excel and analyzed using Epi-info. Frequencies and percentages of proportion of respondents were computed, data were also summarized in pie charts. Appropriate descriptive and inferential statistical methods will be applied on the data collected. Institution ethical committee clearance was obtained before the start of the study. Prior permission from the school was obtained and assent from the students and consent from the parents were obtained before collecting data. Confidentiality of the participants were maintained.

## RESULTS

The study was conducted among 210 high school students of urban Chennai. Since the students are from high school the common age group was between 13 to 15 years and most of the study participants belongs to the age 14 years. When the students were asked about the knowledge of water conservation and about drinking water most of the students had adequate knowledge. Around 62% of the students correctly told the source of water and more than 92 % of the students were aware of water recycling. Almost all the students were aware of rain water harvesting (99.5%) out of 82% of the students found it to be economical and 94 % of the students rightly said that this process will improve the ground water level. (Table.1) Boiling is the common method of purifying followed by the students at home (46%). More than two third of the study participant were using bore well as a source of drinking water (76%). Majority of the students uses bucket water to take bath (56.2%) compared to shower (16.2%). Around 73 % of the students closes the water tap while brushing. More than 75 % of the students closes the water tap completely after using. Around 86 % of the students had no water leakage at their home. 18 % of the students responded that they always use the running water for cleaning vessels. About washing the vehicles only 12 % of the participants responded that they wash it every day while 41 % of the participants wash their vehicle once in a while. Majority of the study participants (34.3%) always reuse the water and in 74 % of their homes had water harvesting facility. (Table. 2) More than 90 % of the study participants felt harvesting water is essential and 68 % of the students have experienced water shortage in their home. 43 % of the students though that they are wasting water and when asked about the main reason for water shortage the students responded that failure to store the incoming water (26.2 %) and wasting water (26.2 %) as the main reason for shortage of water. Majority of the student (52 %) felt they are responsible for the water shortage. Newspaper and magazines (33.8%) were the main source of awareness and information about water conservation and harvesting for the students. (Table. 3).

**Table 1:** Distribution of study participants based on Knowledge on water conservation

Variables	Frequency (n)	Percentage (%)
<i>Age</i>		
13 years	22	10.5
14 years	177	84.3
15 years	11	5.2
<i>How much Percentage of earths water is drinkable?</i>		
< 1 %	164	78.1
>5 %	27	12.9
>10 %	5	2.4
>25 %	14	6.7
<i>Largest source of fresh water</i>		
Lakes	24	11.5
Rivers	25	11.9
Ground water	31	14.8
Icebergs	130	61.9
<i>Awareness about water recycling</i>		
Yes	195	92.9
No	15	7.1
<i>Awareness about rain water harvesting</i>		
Yes	209	99.5
No	1	.5
<i>Is rain water harvesting economical</i>		
Yes	173	82.4
No	37	17.6
<i>How can you store harvested rain water? * (multiple choice)</i>		
Bore well	65	31.0
Reservoirs	27	12.9
Underground tanks	64	30.5
Wells	29	13.8
Others	25	11.9
Others	27	12.9
<i>Does rain water harvesting help in improving the ground water level</i>		
Yes	198	94.3
No	12	5.7
<b>Total</b>	<b>210</b>	<b>100</b>

**Table 2:** Distribution of study participants based on practice of water conservation

Variables	Frequency (n)	Percentage (%)
<i>Availability of motor or hand pump</i>		
Yes	173	82.4
No	37	17.6
<i>How do you purify water at your home? *</i>		
Boiling	96	45.7
Filtration	56	26.7
Reverse osmosis	37	17.6
Others	21	10.0
<i>Use of borewell</i>		
Yes	159	75.7
No	51	24.3
<i>What will you use for bathing</i>		
Shower	34	16.2
Bucket water	118	56.2

Both	58	27.6
<i>Do you open the water tap while brushing?</i>		
Yes	10	4.8
Partially open	42	20.0
No	152	72.4
Rarely	6	2.9
<i>Do you completely close the tap after using them</i>		
Always	163	77.6
Mostly	36	17.1
Sometimes	8	3.8
Rarely	3	1.4
<i>Do you have any leaking tapes at home</i>		
Yes	29	13.8
No	181	86.2
<i>Do you use running water for washing vessels</i>		
All the time	39	18.6
Mostly	28	13.3
Sometimes	57	27.1
Rarely	37	17.6
Never	49	23.3
<i>How often do you wash your vehicle</i>		
Once a day	25	11.9
Once in two days	11	5.2
Once in a while	85	40.5
Others	89	42.4
<i>Do you water the plants</i>		
Yes	121	57.6
No	89	42.3
<i>Do you reuse water</i>		
Always	72	34.3
Mostly	31	14.8
Sometimes	49	23.3
Rarely	32	15.2
Never	26	12.4
<i>Do you use RO in your home</i>		
Yes	125	59.5
No	85	40.5
<i>Do you have rain water harvesting facility in your home</i>		
Yes	155	73.8
No	55	26.2
<b>Total</b>	<b>210</b>	<b>100</b>

**Table 3:** Distribution of study participants based on their attitude towards water conservation

Variables	Frequency (n)	Percentage (%)
<i>What do you think of rain water harvesting</i>		
Essential	190	90.5
Not essential	8	3.8
Others	12	5.7
<i>Have you heard of water scarcity in various part of the world</i>		
Yes	201	95.7
No	9	4.3
<i>Have you ever experienced water shortage in your home</i>		

Yes	143	68.1
No	67	31.9
<i>Do you think you are wasting water</i>		
Yes	91	43.3
No	119	56.7
<i>What do you think is the main cause of water scarcity* (multiple choice)</i>		
Over usage	55	26.2
Wasting water	20	9.5
Improper management of available water	43	20.5
Failure to store incoming water	55	26.2
Deficit of natural resources	37	17.6
<i>Do you feel responsible for today's water shortage?</i>		
Yes	109	51.9
Mostly	30	14.3
Sometimes	42	20.0
Rarely	19	9.0
Never	10	4.8
<i>Where do you get information about water conservation</i>		
Newspaper and magazine	71	33.8
Tv news	20	9.5
School	29	13.8
Friends and family	34	16.2
What's app	29	13.8
Others	27	12.9
<b>Total</b>	<b>210</b>	<b>100</b>

## DISCUSSION

The study was conducted among 210 high school students of urban Chennai. Since the students are from high school the common age group was between 13 to 15 years and most of the study participants belongs to the age 14 years. Similar studies regarding the knowledge and attitude about water conservation has been done in different countries of the world. Masserini Lucio *et al.*<sup>15</sup> conducted a study investigating attitudes towards water savings among Italian university students. 429 students under the age group of 32 years were taken as the study sample which is more than the age of our study participants.

Janna M. Parker *et al.*<sup>16</sup> also conducted a study on water conservation behaviour of college students residing in dormitories in the United States. This survey was conducted in a phased manner and per capita usage of different group of dormitories were measured along with self-assessment data of knowledge about water conservation among students. Abdelfattah L Abdallah *et al.*<sup>17</sup> also studied the attitude and knowledge of students about water conservation in Jordan and their attitude towards scarcity of water in the country was also noted. Another study was done in Malaysia by Pey Fang Tan *et al.*<sup>18</sup> where the author studied the low awareness level among university students in a high rainfall tropical country. In this study 1075 students' responses were taken into account which is far more than our sample size. In our study when the students were asked about the knowledge of water conservation and about drinking water most of the

students had adequate knowledge. Around 62% of the students correctly told the source of water and more than 92 % of the students were aware of water recycling. Almost all the students were aware of rain water harvesting (99.5%) out of 82% of the students found it to be economical and 94 % of the students rightly said that this process will improve the ground water level. (Table.1) Boiling is the common method of purifying followed by the students at home (46%). More than two third of the study participant were using bore well as a source of drinking water (76%). Majority of the students uses bucket water to take bath (56.2%) compared to shower (16.2%). Around 73 % of the students closes the water tap while brushing. More than 75 % of the students closes the water tap completely after using. Around 86 % of the students had no water leakage at their home. 18 % of the students responded that they always use the running water for cleaning vessels. About washing the vehicles only 12 % of the participants responded that they wash it every day while 41 % of the participants wash their vehicle once in a while. Majority of the study participants (34.3%) always reuse the water and in 74 % of their homes had water harvesting facility. (Table. 2)

Matthew T. J. Brownlee *et al.*<sup>19</sup> in his study has expressed the importance of place attachment, local-level awareness such as drought impacts and global beliefs as equal factors to concern for drought impacts and ultimately water conservation attitudes. As reviewed by Heberlein *et al.*<sup>20</sup>, a complex relationship of interacting variables impacts

attitudes toward environmental problems and awareness alone is often not enough to promote attitudinal change.

Masserini Lucio *et al.*<sup>15</sup> also showed in their study that family values are highly correlated to subjective norms, and thus the impacts and individuals receive their behaviour from values acquired within and outside of the family, in addition to the interface between the two factors. This study also concluded that women have robust environmental and water conservation worries than men. This finding was supported by Meyer *et al.*<sup>21</sup> in a review, and was contradicted by Cotton. *et al.*<sup>22</sup> More than 90 % of the study participants in the present study felt harvesting water is essential and 68 % of the students have experienced water shortage in their home. 43 % of the students though that they are wasting water and when asked about the main reason for water shortage the students responded that failure to store the incoming water (26.2 %) and wasting water (26.2 %) as the main reason for shortage of water. Majority of the student (52 %) felt they are responsible for the water shortage. Newspaper and magazines (33.8%) were the main source of awareness and information about water conservation and harvesting for the students. (Table. 3). Abdelfattah L Abdallah *et al.*<sup>17</sup> also described that there was a higher prevalence of importance of developing and preserving water resources and the practice of water harvesting among students. Masserini Lucio *et al.*<sup>15</sup> also demonstrated that the knowledge of water bill variation and having the responsibility for paying the water bill suggestively impact a students' water saving behavior and practices. These findings are also supported by studies done by Nataraj and Hanemann. *et al.*<sup>23</sup>

The sample size of the study is one of the limitations of the study further study can be done on the same topic with much higher sample size and covering a larger population in order to obtain a versatile picture of the situation.

## CONCLUSION

In conclusion, we found from our study that the knowledge of the students about water conservation and harvesting is high so as they practice the method of water conservation in their homes, the attitude towards water conservation and harvesting is on a positive note, these students who are ambassadors of the future having a positive attitude shows that the practice of water conservation and water harvesting in future is in safe hands. Even though the proportion of students with positive attitude were higher the job is not done until most of the population shows a similar attitude towards water conservation and harvesting.

## Acknowledgement:

The authors like to thank the undergraduate students for their part in data collection

## REFERENCES

1. Central Ground Water Authority, Government of India. Estimation of water requirement for drinking and domestic use. (Source: NBC 2016, BIS)
2. World Health Organization and the United Nations Children's Fund (WHO and UNICEF). Progress on Drinking Water and Sanitation: 2012 (Update), USA, 2012. Available online: <http://www.unicef.org/media/files/JMPReport2012.pdf> (accessed on 06.01.2021).
3. Diffenbaugh, N.S.; Swain, D.L.; Touma, D. Anthropogenic warming has increased drought risk in California. *Proc. Natl. Acad. Sci. USA* 2015, 112, 3931–3936.
4. Muller, M. Cape Town's drought: Don't blame climate change. *Nature* 2018, 559, 174–176.
5. Neal, B.; Mackellar, P.; Davies, R.G.; Ampt, E. Drought response measures in dampening urban demand. *Inst. Civ. Eng.* 2014, 167, 435–441.
6. Lindsay, J.; Dean, A.J.; Supski, S. Responding to the Millennium drought: Comparing domestic water cultures in three Australian cities. *Reg. Environ. Chang.* 2017, 17, 565–577.
7. Dolnicar, S.; Hurlimann, A.; Grün, B. Water conservation behavior in Australia. *J. Environ. Manag.* 2012, 105, 44–52.
8. Corral-Verdugo, V.; Frias-Armenta, M.; Perez-Urias, F.; Orduna-Cabrera, V.; Espinoza- Gallego, N. Residential water consumption, motivation for conserving water and the continuing tragedy of the commons. *Environ. Manag.* 2002, 30, 527–535.
9. Corral-Verdugo, V.; Frias-Armenta, M. Personal normative beliefs, antisocial behavior, and residential water conservation. *Environ. Behav.* 2006, 3, 406–421.
10. Matos, C.; Teixeira, C.A.; Bento, R.; Varajão, J.; Bentes, I. An exploratory study on the influence of socio-demographic characteristics on water end uses inside buildings. *Sci. Total Environ.* 2014, 466, 467–474.
11. Clark, W.A. Obstacles and Opportunities for Water Conservation in Blagoevgrad, Bulgaria. Available online: <https://etda.libraries.psu.edu/paper/6567/1821> (accessed on 06.01.2021).
12. Beal, C.D.; Stewart, R.A.; Fielding, K. A novel mixed method smart metering approach to reconciling differences between perceived and actual residential end use water consumption. *J. Clean. Prod.* 2013, 60, 116–128.
13. Justes, A.; Barberán, R.; Farizo, B.A. Economic valuation of domestic water uses. *Sci. Total Environ.* 2014, 472, 712–718.
14. Hassell, T.; Cary, J. Promoting Behavioural Change in Household Water Consumption: Literature Review. Available online: <http://www.vu.edu.au/sites/default/files/Promoting%20behavioural%20Change%20in%20Household%20Water%20Consumption.pdf> (accessed on 06.01.2021).
15. Lucio M, Giulia R, Lorenzo C. Investigating attitudes towards water savings, price increases, and willingness to

- pay among italian university students. *Water Resources Management*. 2018 Sep 1;32(12):4123-38.
15. Parker JM, Sams D, Poddar A, Manoylov K. Water conservation behavior: is what we say what we do?. *Journal of Consumer Marketing*. 2018 Sep 10.
  16. Abdallah AL, Al Antary TM. Attitudes of students of the university of jordan towards practicing water harvesting to face the water deficit in jordan. 2021;30 (1):678-88.
  17. Tan PF, Hanafiah MM, Mokhtar MB, Harun SN. Rainwater Harvesting System: Low Awareness Level Among University Students in a High Rainfall Tropical Country. *Malaysian Journal of Sustainable Agriculture (MJSA)*. 2017 Oct 30;1(2):9-11.
  18. Brownlee MT, Hallo JC, Moore DD, Powell RB, Wright BA. Attitudes toward water conservation: The influence of site-specific factors and beliefs in climate change. *Society and Natural Resources*. 2014 Sep 1;27(9):964-82.
  19. Heberlein TA. *Navigating environmental attitudes*. Oxford University Press; 2012 Aug 27.
  20. Meyer A. Heterogeneity in the preferences and pro-environmental behavior of college students: the effects of years on campus, demographics, and external factors. *Journal of Cleaner Production*. 2016 Jan 20;112:3451-63.
  21. Cotton D, Shiel C, Paço A. Energy saving on campus: a comparison of students' attitudes and reported behaviours in the UK and Portugal. *Journal of cleaner production*. 2016 Aug 15;129:586-95.
  22. Nataraj S, Hanemann WM. Does marginal price matter? A regression discontinuity approach to estimating water demand. *Journal of Environmental Economics and Management*. 2011 Mar 1;61(2):198-212.

Source of Support: None Declared  
Conflict of Interest: None Declared

