Original Article

Perceptions and Behaviour towards Environment among High School Students in Kancheepuram District, Tamil Nadu: a Cross-sectional Study

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Abstract:

Introduction : The world today encounters a wide range of environmental challenges such as climate change, water shortages, air pollution and loss of biodiversity. Technological advancements and resultant human activities through the years have caused significant disruption of environmental sustainability. Apart from collaborative efforts involving all stakeholders, individual environmental literacy and appropriate behaviour is the need of the hour. Considering the significant paucity of environmental surveys in the last decade, this study was planned to identify perceptions and behaviour towards environment among high school students in Kancheepuram district, Tamil Nadu. **Materials and Methods:** This was a cross-sectional study conducted among students of classes 11 and 12, as part of an environmental education programme for school children between November and December 2018. A pretested, semi-structured questionnaire was used to assess perceived awareness and attitudes on selected environmental issues and extent of environment-friendly behaviour among individuals and their families.**Results:** The results revealed that students had better awareness about local environmental issues such as water scarcity and air pollution, while awareness on broader issues like global warming and nuclear waste was inadequate. The majority opinion was that most of these issues were bound to worsen in future. Consistent positive behaviour was observed in environmental activities which involved low cost, fewer restrictions and tangible benefits. **Conclusion:** Students imbibe opinions and practices from their families. Hence their perceptions and behaviour could be reflective of the community they belong. Targeted information with field-based environmental conservation activities is imperative to inculcate positive perceptions and behaviour among students. Students being best ambassadors of health could instil the same in their families, improving the environmental literacy of the communities.

Key words: Environmental attitude; environmental behaviour; environmental literacy; energy efficiency; waste recycling.

Introduction :

Humans play a unique role as main moulders of the very environment they inhabit. Environment provides physical sustenance, and opportunities for intellectual, moral, social and spiritual growth.[1] But in the long course of evolution, scientific and technological advancements and resultant human activities threaten to disrupt sustainability of environment, temporarily or permanently.[1] The world today encounters a wide range of environmental challenges such as climate change, water shortages, air pollution and loss of biodiversity.[1]

Water stress affects more than 2 billion people globally.[2] By

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2050, at least one in four people are estimated to suffer recurring water shortages.[2] More than 40% of global population sustain on unhealthy, pollutant fuels for cooking.[2] An approximate 40% of ocean is endangered by pollution, depleted fisheries, loss of coastal habitats and other human activities.[2] Rapid growth of cities with increasing migration and mushrooming slums contribute to 60 to 80% of energy consumption and at least 70% of carbon emissions. [2] Air pollution is emerging as a major cause of mortality with an approximate 4.2 million and 3.8 million annual deaths occurring due to ambient and household air pollution respectively.[3] According to the Fifth Assessment Report of Intergovernmental Panel on Climate Change (IPCC) 2014, the world is at the verge of entering an age of "committed climate change" which implies that certain impacts of climate change such as extinction of species and loss of biodiversity are now irreversible, regardless of future mitigation or adaptation actions.[4]

Responding to the threatening future presented by these reports, the world has recognised the need for immediate action and collective responsibility. Nine out of seventeen Sustainable Development Goals (SDG) are directly or indirectly related to environmental sustainability and to evaluate environmental targets, the United Nations has identified 93 indicators in 2018.[2,5,6] But the damage, incurred by environment through the years is so profound that apart from international and national endeavours, attainment of these targets requires committed individuals willing to make a change towards environmental conservation and protection. Lynn and Longhi report that only 16% of population consider themselves environment-friendly from a longitudinal household survey in United Kingdom.[7]

Several national and regional surveys on environmental attitudes and practices have been reported from various countries in the last decade.[8,9,10] But review of recent literature suggests paucity of large-scale environmental research. With environmental challenges impending to escalate in future, it is imperative that younger generation are equipped with knowledge to conserve environment and prevent and mitigate ecological catastrophes. Environmental literacy is the need of the hour.

North American Association for Environmental Education (NAAEE), defines an environmentally literate person as someone who, both individually and with others, makes informed decisions concerning environment; is willing to act on these decisions to improve well-being of other individuals, societies and global environment; and participates in civic life.[11] Enhancing environmental literacy in a population requires sufficient understanding of individual perceptions and behaviour.

This study was a preliminary step to identify perceptions and behaviour towards environment among high school students in Kancheepuram district as part of an environmental education programme organised in our field practice area.

Materials and methods:

This was a descriptive, cross-sectional study conducted among students of 11th and 12th classes of a Government school in a rural area of Kancheepuram district, between November and December 2018, using a pretested, semi-structured questionnaire. Assuming that atleast 50% of students will have positive environmental practices, sample size was calculated with formula, $4pq/d^2$, with 'p' and 'q' as 50% and absolute error (d), 8%. The sample size derived was 156 and assuming a minimum of 10% non-response, the final sample size was approximated to 170. Two sections were randomly selected from classes 11 and 12 and all students were invited to participate in the study. The students were asked to enlist three high-priority environmental issues which they considered were of utmost importance in today's world. Based on their responses, seven common environmental issues were identified (air pollution, water scarcity, global warming, hazards of nuclear waste, use of genetically modified (GM) crops, deforestation and extinction of plant and animal species) to be included in the questionnaire. The questionnaire comprised of four sections namely, basic sociodemographic details; perceived awareness about common environmental issues; attitude towards above environmental issues and statements pertaining to individual and household environmental behaviour. The questionnaire was prepared in English, translated into local language and back-translated into English to check for consistency and clarity. The final questionnaire was presented in both languages.

Perceived awareness about environmental issues was measured and coded based on their choice of one of the following options: 1- never heard; 2- heard but would not be able to explain; 3- know something and could explain the issue broadly; 4- familiar and would be able to explain well. A higher score would indicate better knowledge. To assess attitude towards environmental issues, the students were asked if the selected problems would improve or remain the same or deteriorate in future. The responses were coded as follows: 1- will improve; 2- remain the same and 3- will deteriorate. Lower the score, more positive would be the attitude. In the final section, on environmental behaviour, the students were asked to choose one of the following options based on their individual and household practices: Always, Often, Rarely and Never. All statements except the last one denoted positive behaviour and were scored in ascending order (1-Never; 2- Rarely; 3-Often and 4-Always) so that a higher score implies positive behaviour. The last statement was coded in reverse. With 24 items, the maximum score that could be achieved was 96.

After obtaining Institutional Ethics Committee approval and requisite permissions from school authorities, students were explained about the purpose of study. A written informed consent was obtained from participants and the questionnaire was administered. Each question was explained and queries raised by students were clarified by investigators. With assistance of school authorities, a health education programme was organised for students and they were briefed about common environmental issues, role of environment in health and ways in which individuals and families can play an effective role in environmental conservation.

Table 1: Distribution of Baseline characteristics of study participants

Variable	Frequency (N=192)	Percentage (%)
Gender		
Male	105	54.7
Female	87	45.3
Class		
Standard 11	110	57.3
Standard 12	82	42.7
Type of family		
Nuclear	145	75.5
Joint	47	24.5
Mother's educational status		
Primary	24	12.5
Middle	43	22.4
High	98	51
Higher secondary	24	12.5
Degree	3	1.6
Mother's occupational status		
Farmer	128	66.7
Homemaker	61	31.8
Tailor	2	1
Headmistress	1	0.5
Father's educational status		
Primary	12	6.25
Middle	26	13.54
High	108	56.25
Higher secondary	36	18.75
Degree	10	5.21
Father's occupational status		
Farmer	163	84.9
Irregular income	27	14.1
Regular income	2	1

The data was entered in Microsoft Office Excel 2007 and analysis was performed using Statistical Package for Social Sciences (SPSS) version 23.0. Categorical variables were expressed as frequencies and percentages. Continuous variables were summarised as mean and standard deviation (SD). Chi-square test was used for statistical analysis of categorical variables. A P-value equal to or less than 0.05 was considered significant.

Results:

A total of 192 students participated in the study. Age of students ranged between 15 to 18 years with mean of 16.25 years (SD:+0.72). Table 1 presents the basic sociodemographic details of participants.

Environmental knowledge among participants was assessed by their perceived awareness on seven selected environmental issues (Figure 1).

The score for perceived environmental awareness ranged between 14 and 28. For a maximum score of 28, the mean score of participants was 21.07 (SD +2.62). Depending on mean score, the participants were categorised as those with good and inadequate perceived awareness. Sixty two percent (119) of participants had good perceived awareness and 38% (73) were categorised to have inadequate perceived environmental awareness.

To assess environmental attitudes, students were asked if the selected environmental issues will improve or remain the same or deteriorate in future. The distribution of their responses is presented in Figure 2.

The environmental attitude score of the students ranged from 7 to 21 with a mean score of 16.77 (SD: ±2.41). Based on mean attitude score, students were categorised into those with favourable (116 participants, 60.4%) or unfavourable (76 participants, 39.6%) environmental attitude.

Figure 1: Distribution of Perceived awareness about selected environmental issues among participants (N=192)

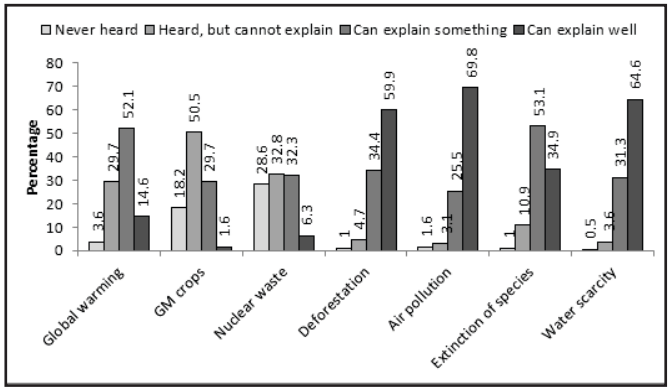
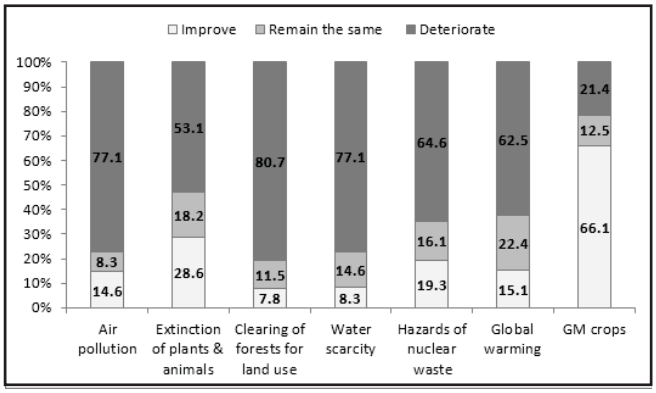


Figure 2: Distribution of Perceived attitude about selected environmental issues among participants (N=192)



A higher proportion of students of class 12 and children of mothers who had completed higher secondary education had good perceived awareness score and the association was statistically significant (P<0.05).

Significant association was identified between class of study and perceived attitude score. A higher proportion of students of class 12 had unfavourable attitude about environmental issues (P<0.05).

Table 2 showcases the frequency and extent of environment-friendly behaviour among participants and their families. Twenty-four common behaviours pertaining to both individuals and families were assessed and scored, with a higher score implying positive behaviour and a lower score implying unfavourable behaviour.

The mean score was 61.7 (SD:±8.1). Among the study population, 103 participants (53.6%) were identified to have good individual or household environmental behaviour and 89 participants (46.4%) had inadequate environmental behaviour. The mean score did not differ significantly between gender, class of study or type of family.

A higher proportion (69.9%) of those with inadequate awareness had favourable environmental attitude compared to those with good awareness (54.6%) and the difference was statistically significant (Chi-square value: 4.395 with degree of freedom:1; P <0.05). The environmental behaviour of participants did not show any significant difference depending on the level of environmental awareness or attitude.

Discussion:

A total of 192 students participated in the study and 54.7% of them were males. The mean score for perceived awareness was 21.07 (SD: 2.62) for a maximum achievable score of 28. An approximate two-third of participants reported adequate self-perceived awareness for immediate issues such as air pollution, water scarcity and consequences of deforestation for other purposes of land use. For statements on GM crops and nuclear waste, 18.2% and 28.6% of participants respectively reported not having heard about the issue and an approximate three-fourth reported that they knew something but would not be able to explain well. The overall awareness about global warming and extinction of plants and animals was poor with only 14.6% and 34.9% respectively confident enough to explain about the issues. In comparison, in a Maltese study, students of similar age group had substantial knowledge about green house effect (69.6%) and other broader global issues such as ozone layer (72.1%) and biodiversity depletion (63.1%).[12] The study also identifies school-based environmental education, television and internet as chief and reliable sources of information.[12] Our findings are in contrast to those established by Yapici et al among University students in Turkey, where radioactive waste was identified to be the highest risk.[13] This difference in perception could be attributed to the area of residence and environmental risks encountered in the area. The first nuclear plant of Turkey was planned at Mersin which could be the reason why students perceived it as immediate risk.[13] In our study setting, deforestation and use of agricultural lands for residential and industrial purposes and resultant water scarcity and air pollution are imminent problems, considering that most students were from agricultural families. Hence awareness about these issues reflects the sensitivity of students to mentioned environmental problems or likely exposure to consequences of these problems. But considering the dire need for proactive environmental measures and poor perceived awareness among students on critical global issues such as global warming, nuclear waste and extinction of species it is imperative that focused environmental education be imparted as part of school curriculum. Keinonen et al study in a demographically different population supports the universal concern about issues such as water shortage and air pollution, decreased biological diversity of animals and plants and global warming.[14] Msengi et al in their study among students in Texas report a comparative lack of knowledge on key environmental issues such as global warming, air and water pollution.[15]

The attitude of the students was assessed by asking whether the selected environmental issues will improve, remain the same or deteriorate in future. More than half participants felt that extinction of plants and animals will worsen and an approximate two-third opined that issues of nuclear waste and global warming will worsen. In Naquin et al study, 52% of students expressed concern about global warming.[16] Despite high level of awareness with regard to air pollution, water shortage and deforestation, more than three-fourth participants felt that these problems would deteriorate in future. Similar high attitude of concern about pollution-induced damage to earth was also reported by more than three-fourth of students in Naquin et al study.[16] Our study reveals an overall negative or unfavourable attitude on most environmental problems. The negative attitude reveals the

Table 2: Distribution of Individual and Household Environmental behaviour among participants (N=192)

Statements of Environmental behaviour, n (%)	Always	Often	Rare	Never
Energy efficiency at home				
Switch off fans and lights when leaving a room	122 (63.5)	62 (32.3)	4 (2.1)	4 (2.1)
Charging mobile phones or laptops only as long as needed and unplug when not in use	70 (36.5)	80 (41.7)	29 (15.1)	13 (6.7)
Keeping electronic devices and appliances switched off when not in use. (e.g. computers, printers, mobile phones, gas cylinder, television, radio etc.)	123 (64.1)	26 (13.5)	8 (4.2)	35 (18.3)
Taking shorter showers to save water	56 (29.2)	39 (20.3)	12 (6.3)	85 (44.3)
Bathing in bucket of water over using a shower	133 (69.3)	15 (7.8)	3 (1.6)	41 (21.4)
Use energy efficient bulbs at home	31 (16.1)	44 (22.9)	9 (4.7)	108 (56.3)
Turn off water while brushing teeth.	137 (71.4)	16 (8.4)	4 (2.1)	35 (18.3)
Use as little water as needed while washing dishes.	87 (45.3)	53 (27.6)	10 (5.2)	42 (21.9)
Switch off fans/ close leaking taps on the way	142 (74)	41 (21.3)	2 (1)	7 (3.7)
Wash cycle/bike in bucket of water than using pipes	87 (45.3)	70 (36.4)	5 (2.6)	30 (15.6)
Waste reduction, recycling and reuse				
Recycle or reuse paper at residence instead of putting it in regular trash.	41 (21.4)	66 (34.4)	12 (6.3)	73 (38.1)
Recycle or reuse glass instead of putting it with trash (e.g. honey or oil bottles)	27 (14.1)	42 (21.9)	7 (3.6)	116 (60.4)
Recycle or Reuse plastic instead of putting it in trash (e.g. plastic drink bottles or food containers)	36 (18.8)	33 (17.2)	8 (4.2)	115 (59.9)
Using both sides of paper for writing or printing.	122 (63.5)	27 (14.1)	4 (2.1)	39 (20.3)
Segregating solid waste as degradable and non-degradable and dispose accordingly.	22 (11.5)	28 (14.6)	11 (5.7)	131 (68.2)
Composting kitchen waste.	47 (24.5)	38 (19.7)	9 (4.7)	98 (51)
Dispose waste in dustbin	61 (31.8)	75 (39.1)	19 (9.9)	37 (19.3)
Do not waste food	50 (26)	80 (41.7)	28 (14.6)	34 (17.7)
Using paper cups and other degradable items instead of plastic	29 (15.1)	110 (57.3)	10 (5.2)	43 (22.4)
Eco-friendly shopping				
Avoiding single-use plastics while shopping	36 (18.8)	48 (25)	45 (23.4)	63 (32.8)
Carrying cloth bag for shopping	22 (11.5)	47 (24.5)	24 (12.5)	99 (51.6)
Refusing plastic bags or covers	28 (14.6)	52 (27.1)	13 (6.8)	99 (51.5)
Travel behaviour				
Cycling/ walking shorter distances (for school/ work/ shopping/ socialising) instead of using bikes or cars	81 (42.2)	80 (41.7)	4 (2.1)	27 (14)
Anti-environmental behaviour				

perceived despair among participants and possible lack of information about the effective role individuals or families can play in environmental protection.

The individual environmental behaviour of students was broadly classified into categories pertaining to energy efficiency at home, waste reduction and recycling, eco-friendly purchasing, transport behaviour and anti-environmental behaviour. Most students reported favourable behaviour for routine activities concerned with energy conservation at home such as switching off electrical and electronic equipments when not in use and bathing from bucket of water instead of using shower. But proactive behaviours such as use of energy-efficient bulbs at home and taking short showers to save water were rarely practised by participants and their families. Distribution of frequency of economic water use while washing dishes and washing bicycles or bikes showed minimal variation with less than 50% practising it always. Except for duration of shower, it is possible that the remaining practices were dependent on or influenced by household behaviour as a whole, which might have accounted for the varied distribution. Bronfman et al, Davidson et al, Wilcox MA report similar findings emphasising the role of cost, convenience factor, lack of alternate options and practical considerations in influencing pro-environmental behaviours or otherwise among different populations.[8,17,18]

In Naquin et al study, an approximate 70% of students reported turning off water while brushing teeth and minimising water use while bathing which was similar to our study.[16] Despite high level of knowledge on environmental issues, only an approximate one-third of students made any conscious effort towards water conservation (37.2%) and electricity conservation (37%) in Mifsud study conducted among Maltese youth.[12] This picture points to the fact that adequate awareness may not always translate into action without sufficient motivation.

About one-fourth of our participants reported solid waste segregation practices in their households. Mifsud reports similar low proportion of waste separation practices among Maltese youth.[12] On enquiry about recycling practices in households, on an average, 42.6% students reported regular or almost regular recycling of paper (55.8%), plastics (36%) and glass (36%) in their households, and the proportions were substantially higher than that reported by Mifsud and Naquin et al.[12,16]

Eco-friendly transport behaviour varied among different studies. In our study an approximate 80% students reported walking or cycling or using public transport for school or work in their families. In Mifsud study 38.8% reported walking for short distances instead of using transport.[12] But transport behaviour depends to a greater extent on the availability of choices and socioeconomic status of the families. As inferred from educational and occupational status of parents, our study population predominantly belonged to an agricultural community, with seasonal, irregular income. Hence the lack of other options might have contributed to positive transport behaviour.

In our study, except for class of study and mother's educational status, other sociodemographic characteristics did not show significant association with perceived awareness or attitude score. Msengi et al also reported lack of significant association between gender and perceived knowledge or attitude score.[15] In contrast, Yapici et al, Naquin et al and Ugulu et al have reported higher environmental attitude scores and risk perception among females.[13,16,19] While students of class 12 had better awareness compared to class 11, there was a contrast in their attitude with a higher proportion of those in class 11 having a favourable attitude compared to those in class 12. In other words, with increasing awareness on environmental issues, students believe that it might be more difficult to prevent or mitigate the situation in future. Naquin et al from their study in Louisiana of United States among children fourth to eighth grade identified significant association of environmental knowledge with higher grade levels.[16] The role of educational status of mother on perceived awareness, though significant presents a varied picture. The perceived awareness was highest among students whose mothers had completed higher secondary education. This finding reinforces the role of family in improving environmental literacy of children.

Msengi et al reported significant association between location of school and environmental attitudes.[15] Our study being conducted in a single school with students residing in proximity, such difference could not be assessed. But Msengi et al finding offers scope to explore and compare environmental awareness, attitude and behaviour of students from various areas with different sociocultural milieu using spatial visualization and geographical analysis tools.[15] Extracurricular activities linked to nature such as field trips and maintaining a school garden have been identified to have significant positive influence on environmental attitudes of children.[20,21]

Summarising, our participants were aware about most local environmental issues, though the perceived awareness about global warming and hazards of nuclear waste was sub-optimal. The overall perceived attitude on future of common environmental issues was unfavourable. Consistent positive behaviour was observed in environmental activities which involved low cost, fewer restrictions and tangible benefits such as water and power conservation at home. Proactive environmental behaviours such as segregation and recycling of waste, carrying cloth bags or refusing plastic covers while shopping were found to be practised by a lesser proportion of students. The broader picture in our study points to the fact

that family can play an effective role in inculcating positive environmental behaviour among children at household level. Yet, development of favourable environmental attitudes and pro-active behaviour requires intensive educational measures as part of school and college curriculum. The students in turn will bring the knowledge back to their homes and society they live in resulting in a long-term change.

Being a preliminary effort, our study was not without its limitations. As with all self-reported studies assessing awareness, attitude and behaviour, accuracy of responses could not be verified. But the respondents were ensured complete confidentiality and anonymity to encourage true responses. Very few studies have focussed on environmental attitudes and behaviour of school students and the studies reviewed vary widely in terms of educational grades of study population, geographical location and study tool used making comparisons difficult. Since the study was conducted from a single school, the results could not be extrapolated to the entire state or similar population from a different location.

India being a diverse country, not just in terms of socioeconomic status, but also with respect to geographical, climatic, socio-cultural and ethnic characteristics, there is a need for similar studies among different sub-groups of population to identify the barriers for pro-environmental attitudes and behaviour. In times of imminent ecological catastrophes, the knowledge would help initiate and implement necessary measures towards environmental protection by all stakeholders.

Conclusion :

Our participants had high perceived awareness for local environmental issues, while awareness on broader issues was inadequate. The overall attitude on future of environmental challenges was unfavourable. Despite consistent positive behaviour towards environmental activities with tangible benefits, students rarely practised pro-active environmental measures. Our study reinforces the need to empower students with sufficient environmental knowledge and positive attitudes and inculcate environmentally responsible behaviour among children, through targeted, field-based educational programmes.

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