



# PERCEPTION OF WATER POLLUTION ISSUES BY ADOLESCENTS IN BANGALORE CITY

Dr. Rebecca John<sup>1</sup>, Dr. Mamatha B.<sup>2</sup>

<sup>1</sup>Associate Professor, <sup>2</sup>Associate Professor

Smt. V.H.D. Central Institute of Home Science, Bengaluru, Karnataka

## ABSTRACT

Water pollution is the introduction into fresh or ocean waters of chemical, physical, or biological material that degrades the quality of the water and affects the organisms living in it. This process ranges from simple addition of dissolved or suspended solids to discharge of the most insidious and persistent toxic pollutants (such as pesticides, heavy metals, and nondegradable, bio-accumulative, chemical compounds). The objectives of the study were to assess the adolescents' perception on water pollution; to find out their knowledge regarding the sources of water pollution; and to assess the measures undertaken by them to overcome water pollution. Sample size was six hundred and twenty five adolescents, both boys and girls, from four different zones of Bangalore city. A multistage random and cluster sampling was the sampling technique used. Salient findings revealed that most of the respondents were partially aware of water pollution, and majority felt that industrial effluents that flow through water supply pipes were the main sources of water contamination.

**KEYWORDS:** Adolescents, suspended solids, sources, industrial effluents, contamination

## INTRODUCTION

Water pollution (or aquatic pollution) is the contamination of water bodies, usually as a result of human activities, so that it negatively affects its uses. (Von Sperling, 2015). Water bodies include lakes, rivers, oceans, aquifers, reservoirs and groundwater. Water pollution results when contaminants are introduced into these water bodies. Water pollution can be attributed to one of four sources: sewage discharges, industrial activities, agricultural activities, and urban runoff including stormwater. (Eckenfelder Jr., 2000).

Water had been the epicenter of human civilizations since the very beginning, as mankind needed water for drinking, irrigation, industrial, navigational and many other uses. Rapid urbanization, rise in human population, increased industrial uses and wastage of water had resulted in increased water demands. Further the increased environmental pressures on the water resources had resulted in degradation in the water quality of these already scarce water resources, thereby further worsening the water availability scenario. (Malik et al., 2014).

Rosin et al. (2013) stated that the pollution of groundwater due to industrial and municipal wastewaters was of rising concern in many cities and industrial clusters of India.

## THEORITICAL FRAMEWORK

### OBJECTIVES:

1. To assess the adolescents' perception on water pollution.
2. To find out the adolescents' knowledge regarding the sources of water pollution.
3. To assess the measures undertaken by the adolescents to overcome water pollution.

### HYPOTHESES:

H<sub>0(1)</sub> - Adolescents do not have awareness regarding water pollution.

H<sub>0(2)</sub> - Adolescents do not have knowledge on the sources of water pollution.

### POPULATION AND SAMPLE:

UNESCO (2011) stated that the school is a unique institution where connections are made between problems and local life. It has the potential of serving as an enabler of change and of facilitating the acquisition of the knowledge and skills necessary to function as an active and responsible citizen.

The present study was structured on eliciting information on the perception of water pollution by adolescents in Bengaluru city, and to find out the measures taken by them to overcome this issue. A questionnaire was formulated to elicit information on the adolescents' perception of water pollution. The pilot study was conducted on 10 percent of the sample to test the reliability and the validity of tool selected for the study and feasibility of the present study. Based on the results of pilot study, necessary modifications were made.

The study comprised of the main study for which six hundred and twenty-five adolescents studying in the 8th to 10th standards were the population studied. A multistage random and cluster sampling was the sampling technique used for the present study. Adolescents from various schools in all four zones of Bangalore city, namely North, South, East and West zones were randomly selected based on the school syllabi. The data collected through survey method was tabulated and analyzed, and appropriate statistical tests were applied wherever necessary.

## RESULTS AND DISCUSSION:

The analyzed data and corresponding discussions are presented below:

The socio-demographic information of the adolescents is as follows: Six hundred and twenty five adolescents from selected schools with varied syllabi (SSLC, CBSE and ICSE) from the different zones of Bangalore city comprised the sample for the survey. Adolescents in the age group of 12-14 years comprised 38.2 percent of the total sample while those in the age group of 14-16 years were 61.8 percent. Boys constituted about 56 percent of the sample and girls were 44 percent. It is observed that 40.5 percent were from schools with SSLC syllabus; ICSE 31 percent and 28.5 percent adolescents studied the CBSE syllabus. The data obtained reveals that 44 percent adolescents were from the 8<sup>th</sup> standard; 46 percent belonged to 9<sup>th</sup> standard while 9.9 percent studied in the 10<sup>th</sup> standard.

**TABLE – 1: Awareness on Concepts of Water Pollution**  
N=625

Aspects	Adolescents	
	N	%
<b>Awareness of Water pollution</b>		
Fully Aware	297	47.5
Partially Aware	328	52.5
<b>Meaning of Water pollution</b>		
Adverse effect upon water bodies caused by human activities	587	93.9
Contamination of water by usage of children	21	3.4
Contamination by rainfall impurities	17	2.7
<b>Industrial effluents that flow through water supply pipes</b>		
Contaminates the ground water table	522	83.5
Does not contaminate the ground water table	103	16.5

It is discernible from Table 1 that 52.5 percent of the adolescents were partially aware of water pollution with 47.5 percent being fully aware of this aspect. Majority (93.9%) of the adolescents were acquainted with the fact that water pollution was the adverse effect upon water bodies caused by irresponsible human activities. Majority (83.5%) of the adolescents felt that industrial effluents that flow through water supply pipes contaminate the water while 16.5 percent said otherwise. The results of the study by **A. Al-Maliki et al. (2021)** on the university students' awareness regarding water pollution in Iraq revealed that environmental education contributed to reducing water pollution. The study was conducted in Wasit university, Wasit province, Iraq with 388 students from the civil engineering department and engineering college. The results showed that most students have high interest in environmental conservation, yet, a lack of education in general environmental education, as the educational curriculum focused on theoretical aspects more than the practical ones.

**TABLE – 2: Awareness on the Major Sources of Water pollution**

N=625

No.	Source of Pollution	Adolescents (%) Ranking							Average	Preferential Ranking
		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup>		
1	Sewage flowing from drains	37.8	18.6	12.8	10.9	8.2	6.6	5.3	2.74	I
2	Inadequacy of storm water drains in the city	4.3	10.2	13.4	13.6	17.3	22.2	18.9	4.72	V
3	Mixing of sewage water with drinking water pipes	27.7	21.4	16.8	7.7	11.2	8.2	6.9	3.05	II
4	Unhygienic water bodies	11.0	13.8	19.0	21.1	12.3	13.0	9.8	3.88	III
5	Poor condition of water bodies	7.8	14.1	13.9	17.3	21.1	14.7	10.9	4.17	IV
6	Unsafe drinking water sources	7.2	14.4	13.9	18.1	18.6	17.1	10.7	4.21	VI
7	Unsafe bottling of mineral water	3.7	7.0	10.2	11.8	11.8	18.2	37.1	5.24	VII

\*\* Significant at 1% level,

NOTE:  $W = 0.1657$ ,  $\chi^2_{cal} = 621.38^{**}$ ,  $\chi^2(0.01, 5 \text{ df}) = 16.812$ 

From the results in Table 2, it is apparent that first ranking was accorded to sewage flowing from the drains in the city being the major source of water pollution; mixing of sewage water with drinking water pipes ranked second; and unhygienic water bodies being given third ranking. Poor condition of water bodies was ranked fourth; inadequacy of storm water drains in the city ranked fifth; unsafe drinking water sources ranked sixth; and unsafe bottling of mineral water given the last ranking by the adolescents. The data subjected for statistical test reveals that the preferential ranking on adolescents' opinions regarding the major sources of water pollution was found to be significant ( $p < 0.01$ ). Results of the study by **Das, M. (2015)** revealed that secondary school students in Tribeni, Hooghly District were aware of the sources of water pollution, like activities such as washing vessels, animals and oily drums, discharge of unauthorized hazardous waste which were carried out along the course of rivers. Barrel cleaners, scrap dealers and others dumped sludge oil, effluent and garbage in the river. The organic waste, sludge and garbage dumping reduced the carrying capacity of the river, and was a threat to marine life.

**TABLE – 3: Measures to Overcome Water Pollution**

N=625

No	Measures to Overcome Water Pollution	Adolescents (percent) Ranking					Average	Preferential Ranking
		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>		
1	Ensure that sewage drains are functioning properly	35.2	22.4	18.2	13.0	11.2	2.43	I
2	Adequate storm water drains in the city	6.9	14.9	19.5	32.6	26.1	3.56	V
3	Precaution while bottling drinking water	14.2	16.8	17.9	19.2	31.8	3.38	IV
4	Hygienic handling of drinking water at public places	18.7	25.1	23.7	18.2	14.2	2.84	III
5	Adequate care of water bodies in the city	25.0	20.8	20.6	17.0	16.6	2.80	II

\*\*Significant at 1% level,

NOTE:  $W = 0.0854$ ,  $\chi^2_{cal} = 213.50^{**}$ ,  $\chi^2(0.01, 4 \text{ df}) = 13.277$ 

From the results in Table 3, it is clear that ensuring that sewage drains are functioning properly was ranked first by adolescents as one of the measures to overcome water pollution; followed by adequate care of water bodies in the city ranked second; and hygienic handling of drinking water at public places ranked third. Fourth ranking was accorded to taking precautions while bottling drinking water, and last ranking to having adequate storm water drains in the city. The data subjected for statistical test reveals that the preferential ranking on adolescents' efforts to overcome water pollution was found to be significant ( $p < 0.01$ ).

**TABLE – 4: Relationship between Age and Class of Adolescents with Knowledge and Measures for Water Pollution Prevention**

N=625

No.	Aspects	Correlation coefficient (r) with	
		Age	Class
1	Knowledge	+ 0.6195**	+ 0.7092**
2	Measures to overcome pollution	+ 0.7118**	+ 0.5827**

\*\* Significant at 1% level,

NS : Non significant

The results indicate that there exists a positive significant relationship ( $p < 0.01$ ) between knowledge ( $r = + 0.6195^{**}$ ), and measures to overcome pollution ( $r = + 0.7118^{**}$ ) with age of the adolescents. It is clear from the results; the higher the age of the adolescents, the better is their knowledge, and measures to overcome water pollution.

Similarly, there is a positive significant relationship ( $p < 0.01$ ) between knowledge ( $r = + 0.7092^{**}$ ), and measures to overcome pollution ( $r = + 0.5827^{**}$ ) with class of the adolescents. It is apparent from the results; the higher the class of the adolescents, their knowledge, and measures are correspondingly enhanced.

## SUMMARY:

This study was conducted to elicit the information on the awareness of water pollution by the adolescents from the different schools' syllabi in Bengaluru city; as well as their measures about overcoming this problem.

### The results of this study have been summarized as follows:

Six hundred and twenty five adolescents from selected schools with varied syllabi from the different zones of Bangalore city comprised the sample for the survey. Adolescents in the age group of 12-14 years comprised 38.2 percent of the total sample while those in the age group of 14-16 years were 61.8 percent. Boys constituted about 56 percent of the sample and girls were 44 percent.

Most of the adolescents were partially aware of water pollution; while majority were acquainted with the fact that water pollution was the adverse effect upon water bodies caused by irresponsible human activities. Also, majority of them felt that industrial effluents that flow through water supply pipes contaminated.

The first ranking was accorded to sewage flowing from the drains in the city being the major source of water pollution; mixing of sewage water with drinking water pipes ranked second; and unhygienic water bodies being given third ranking.

Majority of the adolescents felt that ensuring that sewage drains are functioning properly was ranked first by adolescents as one of the measures to overcome water pollution; followed by adequate care of water bodies in the city ranked second; and hygienic handling of drinking water at public places ranked third.

Finally, there exists a positive significant relationship ( $p < 0.01$ ) between knowledge ( $r = + 0.6195^{**}$ ), and measures to overcome pollution ( $r = + 0.7118^{**}$ ) with age of the adolescents. It is clear from the results; the higher the age of the adolescents, the better is their knowledge, and measures to overcome water pollution. Similarly, there is a positive significant relationship ( $p < 0.01$ ) between knowledge ( $r = + 0.7092^{**}$ ), and measures to overcome pollution ( $r = + 0.5827^{**}$ ) with class of the adolescents. It is apparent from the results; the higher the class of the adolescents, their knowledge, and measures are correspondingly enhanced.

## CONCLUSION:

### The major findings of this study:

- Most of the adolescents were partially aware of water pollution; while majority of them felt that industrial effluents that flow through water supply pipes contaminated it.
- The sewage flowing from the drains in the city was ranked as the major source of water pollution.

- Majority of the adolescents felt that ensuring that sewage drains are functioning properly was the primary measure to overcome water pollution in the city.
- Also, the higher the age of the adolescents, the better is their knowledge, and measures to overcome water pollution.

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