

## ORIGINAL ARTICLE

# Exploring Water Conservation Awareness Level Among Primary School Children From Melaka (Malaysia)

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## ABSTRACT

**Introduction:** In Malaysia, various environmental projects have been introduced in schools to increase environmental awareness among school children. However, limited quantitative information of these environmental education projects to increase school children awareness. **Objective:** This study aims to assess the awareness (knowledge, attitude, and practices) level of water conservation initiatives in a primary school in Melaka (Malaysia). Associations between knowledge, attitude, and practices of water conservation were also assessed among the school children. **Methods:** In this study, a total of 151 school children from Convent Infant Jesus (1) Primary School in Melaka (Malaysia) have involved as respondents in a questionnaire survey. Questionnaire survey was utilized to obtain information on knowledge, attitude and practice of water conservation awareness among primary school children. **Results:** The results indicate that only 33.8% of the school children had good knowledge of water conservation. Meanwhile, 43% of the school children had good attitude towards water conservation awareness. A total of 74.8% of good practices among the school children indicate that they were willing to implement ways to conserve water in school and at home. Weak significant positive linear correlations for knowledge and attitude, knowledge and practices, and attitude and practices were observed among school children in terms of water conservation. **Conclusion:** Quantitative knowledge, attitude and practices information obtained from this study will be translated in the development of suitable water conservation education module for school children to increase their awareness.

**Keywords:** Water, Conservation, Awareness, School children

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## INTRODUCTION

Secure and sustainable use of water resources is a growing challenge worldwide. Nearly 1.8 billion people are expected to experience water scarcity due to population growth, climate change, unsustainable use, and pollution issues (1). In Malaysia, Water Sustainability Index analysis has shown a decrease of 31%, indicating water resources are rapidly depleting and unsustainably managed. Average water consumption per day in Malaysia was 210 liters in 2013 and increased to 212 liters in 2014 which has exceeded the recommended water usage level by the United Nations (2). Malaysia Water Industry Guide<sup>2</sup> has also stressed that Malaysia has the highest water usage compared to neighboring countries such as Thailand (90 liters/day) and Singapore (154 liters/day). With current high water consumption

and wastage, high water demands, and water resources depletion, it is predicted that Malaysia will face water shortage crisis affecting various sectors (household, agriculture, and industry), economic and social developments, together with population growth (3).

Knowledge, attitude, and practices (KAP) is a quantitative survey that aims to collect information on what is known, believed, and implemented related to a particular topic (4). Knowledge is explored to obtain the extent of the knowledge level in a community on a certain topic. Attitude is related to belief or feelings related to a particular topic. Practice usually explores actions, preventive measures, or behavior by a community on what should be done related to a certain topic (5). The advantages of KAP survey are its simple sampling design, cost effectiveness, relevance in obtaining quantitative information, ability to generalize to wider population, suitability in providing information for awareness in program module development, and influence on pro-environmental behavior within the public (6). To date, KAP quantitative surveys related to

environmental issues have been well utilized to obtain quantitative information on solid waste management (7) and climate change (5,8). In comparison, KAP surveys related to water issues have been limitedly utilized to obtain quantitative information on water conservation. Instead, they have been mainly employed on water resource management (9,10), water sanitation and hygiene (11).

Environmental education is seen as a vital part of a school curriculum. Environmental education will be able to cultivate environmental awareness among children and will need to be driven through curriculum and activities (12). Environmental awareness developed by these young children will inspire their environmental stewardship at home and lead to a more sustainable life for the future (13). The importance of environmental education in Malaysia has been acknowledged in both formal and non-formal ways across school curricula (13,14). Despite various implementations of environmental education projects in Malaysian schools, limited studies have assessed KAP levels pertaining to environmental topics among school children (15). According to Mustam and Daniel (14), limited understanding of KAP on environmental topics among school children in Malaysia has been identified as one of the reasons of low effectiveness levels of environmental education projects conducted in schools. The school children are unable to reach appropriate awareness levels and translate into pro-environmental behavior in their daily lives. Ultimately, quantitative information on KAP levels among school children are needed to synthesize the current knowledge and development of the most suitable environmental education module before the implementation of any environmental education projects (16). Therefore, well-designed environmental education modules are a key element to build appropriate awareness among school children and translate into pro-environmental behavior in their daily lives (17).

To the best of our knowledge, this is the first study aimed at assessing the awareness (knowledge, attitude, and practices) levels of water conservation initiatives among Melaka's primary school (Malaysia). The quantitative information obtained from KAP survey questionnaire will contribute to the development of suitable water conservation education modules for school children. A good knowledge of water conservation among them will develop positive attitude and practices to implement water conservation not only in school but also in their daily lives.

## **MATERIALS AND METHODS**

### **Study area and Study Design**

Convent Infant Jesus (1) Primary School (Melaka, Malaysia) is the first girl's school in Melaka state established in 1957 with 469 female students and 36 teachers. This school which is located in the city of

Melaka, is one of the oldest schools in Malaysia. This school is situated in Bandar Hilir in Melaka Tengah district, an area that is also recognized as a World Heritage Site by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) since 2008. A cross-sectional study was designed to obtain awareness levels among school children regarding water conservation. Simple random sampling method was employed to obtain water conservation awareness levels among primary school children as respondents for the KAP survey questionnaire. Representative sample size was determined using a formula by Daniel (18) with a prevalence value of 0.86 (19). In total, 151 respondents comprising primary school children were selected randomly and involved in this questionnaire survey from January to February 2020.

### **Questionnaire survey**

A self-administered 35-item structured questionnaire survey was utilized to gather information on sociodemographic characteristics, knowledge, attitude, and practices regarding water conservation awareness among the primary school children. In addition to sociodemographic information, a total of 14 questions focus on knowledge, 8 questions explore on attitude, and 13 questions address practices towards water conservation awareness. Knowledge questions are made as multiple choices while attitude and practices questions are prepared on a 5-point scale varying from strongly agree (1) to strongly disagree (5). The questionnaire was developed in Malay language and was tested for its reliability and validity. Cronbach's alpha coefficients were more than 0.70 for each section, indicating high and acceptable consistency and validity of the questionnaire. The questionnaire was checked by an expert panel comprising two teachers, two researchers, and an environmental consultant.

### **Data Analysis**

The questionnaire data were analyzed using SPSS ver15.0. Scores of knowledge, attitude, and practices were transformed into mean percentage by dividing the sum scores with item numbers for each section and multiplied by 100. Bloom cut-off scores were used to assess the KAP levels. Scores of KAP between 80% and 100% are considered as good, scores of 60% to 79% are considered as moderate, and scores below 60% are considered as poor. Spearman correlation was utilized to assess the relationship between knowledge, attitude, and practices of water conservation awareness among the primary school children. A significant level (p value) less than 0.05 was taken for correlation analysis.

### **Ethics Approval**

The researcher distributed the informed consent form. This study was approved from Ethics Committee for Research involving Human Subjects of Universiti Putra Malaysia (UPM/TNCPI/RMC/1.4.18.2). Informed consent form was used to obtain permission from the

parents before initiation of the questionnaire survey. Furthermore, consent was obtained from headmaster of Convent Infant Jesus (1) Primary School (Melaka, Malaysia) before conducting the questionnaire survey.

## RESULTS

A total of 151 primary school children were involved in the survey questionnaire with mean age of the respondent was  $9.9 \pm 1.5$  years old. The highest percentage of the respondents was school children aged 11 years (67%) followed by 10 years (16.4%). Table I shows the knowledge levels on water conservation awareness among the respondents. In total, the mean knowledge score on water conservation awareness was  $2.49 \pm 0.44$ . Overall, only 33.8% of the participants had good knowledge while 66.2% of the participants had low knowledge on water conservation. Table II presents attitude scores of water conservation awareness among the primary school children. Only 43% of the participants had good attitude levels with a mean score of 2.57. An overall positive attitude was observed among the participants towards water conservation awareness. Meanwhile, a total of 57% of the participants had poor attitude towards water conservation. Nearly more than 50% of them felt that water-efficient equipment and practices are unable to conserve water especially in schools. Over and above that, only 12.6% of these school children felt that water conservation initiatives will be able to save a lot of water in schools. Table III presents the practices related to water conservation awareness among the respondents. The overall mean score for practices was 1.46 with 74.8% of good implementation practices to save water in school and at home. More than 50% of the participants were willing to ensure no pipes dripping and use minimum water for cleaning, washing hands, taking showers, flushing, and gardening. Furthermore, 75.5% of the participants were willing to use rainwater as water supply in toilets. Table IV presents Spearman correlation between knowledge, practices, and attitude on water conservation awareness among the school children. Weak significant positive linear correlations for knowledge and attitude ( $r = 0.172$ ,  $p < 0.05$ ), knowledge and practices ( $r = 0.209$ ,  $p < 0.01$ ), and attitude and practices ( $r = 0.180$ ,  $p < 0.05$ ) were observed among them.

**Table I. Knowledge levels on water conservation among primary school children**

Water conservation awareness knowledge	n	%	Given score
Do you read about water conservation initiative?			
Yes	144	95.4	1
No	7	4.6	0

**Table I. Knowledge levels on water conservation among primary school children (CONT.)**

Water conservation awareness knowledge	n	%	Given score
What is your reading materials on water conservation initiative?			
Newspaper	8	5.3	
Book	1	0.7	
Magazine	1	0.7	
Television	13	8.6	
Radio	1	0.7	
Social media	16	10.6	
Teachers	90	59.6	
Talking with friends	3	1.9	
Family members	16	10.6	
Brochure	2	1.3	
Know how much water you use daily in school and house?			
Yes	9	6.0	1
No	142	94.0	0
Know the highest water usage in school?			
Yes	127	84.1	1
No	24	15.9	0
Do you think by knowing how much your water consumption will help in your school's water conservation initiative?			
Yes	103	68.2	1
No	12	8.0	0
Not sure	36	23.8	0
Do you know that water audit can be used to trace your water usage in school?			
Yes	66	43.7	1
No	25	16.6	0
Not sure	60	39.7	0
Do you know what is water conservation imitative?			
Yes	51	33.8	
No	50	33.1	
Not sure	50	33.1	
Will water conservation imitative will help to reduce water usage in school?			
Yes	120	79.5	
No	13	8.6	
Not sure	18	11.9	
Do you need more reading material to increase your knowledge about water conservation imitative?			
Yes	120	79.5	
No	6	4.0	
Not sure	25	16.5	

CONTINUE

CONTINUE

**Table 1. Knowledge levels on water conservation among primary school children (CONT.)**

Water conservation awareness	n	%	Given score
Do you need more reading material to increase your knowledge about water conservation initiative?			
Yes	120	79.5	
No	6	4.0	
Not sure	25	16.5	
Do you know what is water efficient product?			
Yes	37	24.5	
No	64	42.4	
Not sure	50	33.1	
Do you know what is rainwater harvesting system?			
Yes	92	60.9	
No	30	19.9	
Not sure	29	19.1	
Do you know how to handle rainwater harvesting system?			
Yes	57	37.8	
No	65	43.0	
Not sure	29	19.2	
Did you know that water from rainwater harvesting system can be used as drinking water?			
Yes	62	41.1	
No	61	40.4	
Not sure	28	18.5	
Have you ever experienced water issues problems at your school?			
Yes	84	55.6	
No	51	33.8	
Not sure	16	10.6	
Total given score	13		
Total mean score (SD)	2 . 4 9		(0.44)
% good knowledge score (score ≥ 8)	33.8		
% poor knowledge score (score ≤ 8)	66.2		

**Table II. Attitudes towards water conservation awareness among primary school children**

Water conservation awareness attitude	N (%)
Water-efficient equipment is a good idea in a conservation initiative water	
Strongly disagree	14 (9.3)
Disagree	79 (52.3)
Neutral	21 (13.9)
Agree	18 (11.9)
Strongly agree	19 (12.6)

CONTINUE

**Table II. Attitudes towards water conservation awareness among primary school children**

Water conservation awareness attitude	N (%)
I will consider for buy water-efficient equipment such as washing machines, sinks, toilet to save water	
Strongly disagree	18 (11.9)
Disagree	69 (45.7)
Neutral	29 (19.2)
Agree	27 (17.9)
Strongly agree	8 (5.3)
I think water-efficient equipment is important in water conservation initiative	
Strongly disagree	13 (8.6)
Disagree	70 (46.4)
Neutral	17 (11.3)
Agree	47 (31.1)
Strongly agree	4 (2.6)
I will look for a rating good of water usage when buying equipment in water conservation	
Strongly disagree	18 (11.9)
Disagree	64 (42.4)
Neutral	30 (19.9)
Agree	31 (20.5)
Strongly agree	8 (5.3)
I feel that water-efficient equipment is also cost effective	
Strongly disagree	15 (9.9)
Disagree	71 (47.0)
Neutral	24 (15.9)
Agree	35 (23.2)
Strongly agree	6 (4.0)
I'll try my best to buy water-efficient equipment where possible	
Strongly disagree	14 (9.3)
Disagree	70 (46.4)
Neutral	30 (19.9)
Agree	31 (20.5)
Strongly agree	6 (4.0)

CONTINUE

**Table II. Attitudes towards water conservation awareness among primary school children**

Water conservation awareness attitude	N (%)
Water efficiency equipment should be mandatory in of all places including in schools	
Strongly disagree	30 (19.9)
Disagree	63 (41.7)
Neutral	25 (16.6)
Agree	21 (13.9)
Strongly agree	12 (7.9)
I don't think it's an initiative water conservation will save a lot of water in school or house	
Strongly disagree	52 (34.4)
Disagree	45 (29.8)
Neutral	35 (23.2)
Agree	11 (7.3)
Strongly agree	8 (5.3)
Total given score	36
Total mean score (SD)	2 . 5 7 (0.06)
% good attitude score (score ≥ 8)	43.0
% poor attitude score (score ≤ 8)	57.0

**Table III. Practices related to water conservation awareness among primary school children**

Water conservation awareness practice	n	%	Given score
I will make sure there are no pipes dripping in school			
Yes	133	88.0	1
No	9	6.0	0
Not sure	9	6.0	
I will close the faucet while washing hands			
Yes	115	76.2	
No	16	10.6	
Not sure	20	13.2	
I will use minimum water during cleaning			
Yes	90	59.6	
No	34	22.5	
Not sure	27	17.9	
I will strictly follow water saving steps			
Yes	124	82.1	
No	10	6.6	
Not sure	17	11.2	
I'll take a short shower to save water			
Yes	102	67.5	
No	21	13.9	
Not sure	28	18.5	

CONTINUE

**Table III. Practices related to water conservation awareness among primary school children (CONT.)**

Water conservation awareness practice	n	%	Given score
I will strictly follow water saving steps			
Yes	124	82.1	
No	10	6.6	
Not sure	17	11.2	
I'll take a short shower to save water			
Yes	102	67.5	
No	21	13.9	
Not sure	28	18.5	
I'll minimize "flush" toilet use where possible			
Yes	88	58.3	
No	24	15.9	
Not sure	39	25.8	
I use showerhead which can save water			
Yes	104	68.9	
No	28	18.5	
Not sure	19	12.6	
I will use rainwater for gardening purposes			
Yes	112	74.2	
No	17	11.3	
Not sure	22	14.6	
I'll collect rainwater to be used at elsewhere in school			
Yes	93	61.6	
No	19	12.6	
Not sure	39	25.8	
I'll use rainwater as water supply in toilet			
Yes	114	75.5	
No	17	11.3	
Not sure	20	13.2	
I'll talk to other friends about water saving			
Yes	125	82.8	
No	12	7.9	
Not sure	14	9.3	
I'll talk to my family members about ways of water savings			
Yes	124	82.1	
No	11	7.3	
Not sure	16	10.6	
I don't feel to save any rainwater for water conservation practice at school			
Yes	51	33.8	
No	58	38.4	
Not sure	42	27.8	
Total given score	12		
Total mean score (SD)	1 . 4 6 (0.10)		
% good practice score (score ≥ 8)	74.8		
% poor practice score (score ≤ 8)	25.2		

**Table IV. Spearman correlations between knowledge, practices, and attitude on water conservation awareness among school children**

	Correlation coefficient, r	p value
Knowledge and attitude	0.172*	0.03
Knowledge and practices	0.209*	0.01
Attitude and practices	0.180*	0.03

\*Correlation is significant at the 0.05 level (2-tailed).

## DISCUSSION

A survey by Lai et al. (20) had indicated that water conservation understanding among Malaysia's general public is still low and needs to be improved through water and environmental education activities. Low knowledge on water conservation can be related to reading materials. Only 8.0% of the total participants relied on newspaper, books, and magazines as their reading materials to obtain information about water conservation. On the other hand, more than 65% of them obtained information on water conservation through teachers, friends, social media, and mass media. Poor knowledge related to water conservation is reflected in the poor attitude among these school children in terms of the role of water conservation initiatives to save water in school or at home. Majority of the participants had also acknowledged the use of rainwater as a means of water conservation practices in schools. The attitude scores indicate that with a good education module to educate these school children, they will be able to change their attitude towards water conservation.

The significant correlations have reaffirmed that good knowledge is crucial in order to lead to positive attitude which results in good practice. Similarly, knowledge, attitude, and practices were also explored among Taiwanese citizens in relation to water conservation awareness. The study summarized that a person who is more concerned on water conservation will show better water conservation attitude and practices in daily life (21). Meanwhile, a study by Aprile Maria Carmela and Damiano (22) has also demonstrated that water conservation practices depend on knowledge and attitude levels as key drivers to save more water. According to Lai et al. (20), the understanding and awareness of Malaysians on water conservation is still low as compared to neighboring countries such as Singapore and Thailand. Poor public awareness can be due to the availability of sufficient water resources throughout the year in Malaysia.

This study has provided quantitative information on water conservation awareness levels among school children to be used as a guide for the development of water conservation education modules in schools. Appropriate water conservation education modules will be used to increase the knowledge of school children related to the importance of water conservation. The increase of attitude and practice levels among school

children will ensure better water management in Malaysia starting from schools. Incorporating appropriate water conservation education modules alongside water conservation practices such as rainwater harvesting will encourage similar practices among school children in their daily lives.

## CONCLUSION

In summary, this study has presented quantitative information of water conservation awareness levels focusing on knowledge, attitude, and practices among school children from Convent Infant Jesus (1) Primary School (Melaka, Malaysia). Poor knowledge and attitude of water conservation initiatives have been found among the school children. High good practice scores indicate their willingness to practice water conservation steps in school or at home. The quantitative awareness levels have highlighted considerable gaps between knowledge, attitude, and practices among school children on water conservation initiatives. Therefore, an appropriate water conservation education module needs to be designed as an intervention step to increase awareness levels among school children. Apart from that, implementation of water conservation initiatives such as rainwater harvesting in schools will further cultivate effective water saving steps among them.

## ACKNOWLEDGEMENTS

This project is supported under the Knowledge Transfer Grant Scheme, Universiti Putra Malaysia (grant number: 9437555). Special thanks to Prof Dr Uma Rani Sinniah (Universiti Putra Malaysia) for guiding this project

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