

CHAPTER 3
WATER CONSERVATION AND WATER QUALITY:
AWARENESS AND ATTITUDE

3.1 INTRODUCTION

Awareness is defined as a person's state of knowing about water usage subject as a result of having heard about it, read about it, seen it, smelt it or felt that it exists (MASTIC, 1999). On the other hand, attitude is defined as the way that you behave towards somebody or something that shows how you think and feel (Oxford University Press, 2002). Awareness and attitude of a person toward conserving the water will to a certain extent determine his or her willingness to comply with laws, regulations and practice (Tan, 2001). Without any concern no action would ever be taken, whether by raising a complaint to related authorities, taking some remedial steps or by participating in some of the environment related community projects. People need to appreciate water conservation. Production of drinking water goes through many stages of purification, which requires enormous amounts of energy. It is also a precious commodity because of the scarcity of raw water available for conversion. Therefore, the less water used, the more is conserved (Ministry of the Environment Singapore and Du Pont Singapore Ptd Ltd Support, n.d.).

This chapter analyses the awareness and attitude of respondents toward water issues. The factors affecting the awareness and attitude of respondents on water conservation will be studied. The knowledge of respondents on the issues on water

wastage, water shortage and water pollution will also be studied. This chapter is also sourcing the mean to increase the awareness on conserving water.

3.2 AWARENESS TOWARDS WATER CONSERVATION

It is important to gauge the basic level of awareness of respondents toward water issue before further investigation into the behaviour of respondents. It is vital since without valuation nobody will appreciate the resources. The opinion of the respondents on the necessity to save water may used as a basic valuation of water usage. Generally, respondents acknowledge the vital of water resources. Almost all the respondents is consensus on the need to save the water (Table 3.1).

Table 3.1: Percentage Distribution of Respondents by the Need to Save Water and Reasons

	Per cent	Number of Cases
Yes	98.9	(640)
The cost of water	39.0	(228)
Ensure the availability of water	34.6	(196)
Vital natural resource	22.0	(157)
Others	4.4	(50)
No	1.1	(7)
Total	100.0	(647)

The cost of water plays a significant role to motivate respondents to save water as 39 per cent of them mention it as the reason for saving water (Table 3.1). About 35 per cent of respondents feel that saving water is to ensure the availability of the water,

22 per cent give the reason that water is vital natural resource and the rest, 4 per cent give other reasons such as, increasing population, for the next generation and so on.

As respondents asked to give their suggestions on saving water, about 46 per cent of respondents provide general and blur suggestions such as, use the water when necessary or wisely (Table 3.2). This shows that majority of the respondents do not have the correct knowledge in handling water conservation. Some 21 per cent of the respondents suggest not to let water running while doing daily activities. About 14 per cent of respondents think that reuse the wastewater or rainwater is meaningful way to save water. Only 2 per cent of respondents would think that the water tariff is too low and need to rise to encourage water saving. Other suggestions such as, taking shower instead of using 'gayung' to bathe, washing the clothes with full load, report the pipe leaking immediately and so on.

Two hundred scientists in 50 countries have identified water shortage as one of the two most worrying problems for the new millennium (the other was the climate change) (World Wild Foundation Malaysia (WWF), 2003). The expectation of the availability of water in future also is the imperative indicator to show the awareness on conserving water. When respondents were asked on the possibility of water shortage in future, some 83 per cent of them think that there is a possibility of shortage of clean water in future (Table 3.3).

Table 3.2: Percentage Distribution of Respondents by the Suggestions to Save Water

Suggestions	Per cent	Number of Cases
Use the water when necessary	28.7	179
Use the water wisely	17.3	108
Do not let the water run continuously	20.7	129
Reuse wastewater or rainwater	13.8	86
Prepare bin and pail for further use	6.3	39
Education and campaign	5.0	31
Increase water tariff	1.8	11
Others	6.6	41
Total	100.0	624

* 3 respondents gave inappropriate suggestions, such as they suggested 'gayung' as the method of bathing instead of showering.

** 20 respondents did not give their suggestions.

Table 3.3: Percentage of Respondents Who Think There is a Possibility of Clean Water Shortage in Future by Selected Characteristics

Characteristics	Per cent	Number of Cases
Gender	Male	81.7 (295)
	Female	84.4 (347)
Ethnic Group	Malay	87.8 (90)
	Chinese	83.0 (489)
	Indians and Others	77.8 (63)
Age Group	< 30	86.4 (228)
	30-39	83.2 (125)
	40-49	83.2 (101)
	50+	79.8 (183)
Education*	No Schooling and Primary	74.4 (90)
	Secondary	80.1 (282)
	Tertiary	89.3 (270)
Total	83.2	(642)

The total cases for age group is 637.

*Significant at $\alpha=0.05$.

A slightly higher percentage of female respondents than male respondents believe in the occurrence of clean water shortage in future (Table 3.3). Malays are more likely to think so compared to their other counterparts. It is interesting to note that the younger the age the more likely the respondent thinks of water shortage in future. Those respondents with tertiary education are more likely to perceive that there is a possibility of water shortage in future compared to those with secondary education or less. The difference in opinion is significant at $\alpha=0.05$. Amongst the reasons given by respondents on clean water shortage in future are river pollution (38%), rapid population growth (16%), deforestation (11%), pipe leakage and poor water management and others (Table 3.4).

Some 17 per cent of respondents think that the water shortage will not be occur in future. Amongst the reasons for no water shortage in future are plenty of water sources such as ocean (36%), advancement of technology can solve the problem (35%), increasing awareness towards environment (15%) and others such as, water is recyclable and government will find the solution (Table 3.4).

In Malaysia, plenty of water is lost through the Non-Revenue Water¹ (NRW). The components of NRW are leakage through pipes, consumer meter under-registration, water theft and other minor losses concerned. Since the first national NRW study

¹ Non-Revenue Water (NRW) is the volume of water supplied into water supply system that do not bring income or revenue to the water supply authorities/companies concerned (Public Works Department, 1999).

initiated in 1986, some progress has been achieved by reducing the national NRW average gradually over the years, the level has decreased from 43 per cent in 1987 to about 36.9 per cent in 1998. However, the volume of the quantity has been increasing from 1,661,184 m³ per day in 1987 to 3,041,191m³ per day in 1998 (Public Works Department, 1999). Of this 36.9 per cent, about 26 per cent alone comprises physical losses through pipe leakage (New Straits Times, 7 April 2002).

Table 3.4: Percentage Distribution by the Possibility of Clean Water Shortage in Future

Response and Reason*	Per Cent	Number of Cases
Yes**	82.5	(534)
River Pollution	38.2	(203)
Rapid Population Growth	16.0	(85)
Deforestation	11.3	(60)
Pipe Leakage & Poor Water Management	10.9	(58)
Wasting Behaviour	8.7	(460)
Lack of Awareness	6.8	(36)
Climatic Change (Low rainfall)	5.6	(30)
Not Enough Dams	2.4	(13)
No***	16.7	(108)
Plenty water from ocean or other sources	36.4	(32)
Technology can solve the problem	35.2	(31)
Increasing awareness towards environment	14.8	(13)
Others	13.6	(12)
Total	100.0	(642)

* 5 respondents do not answer.

**3 respondents do not give their reasons,

***20 respondents do not give their reasons

The respondents were asked about the situation where water wastage could occur. About half of them mention the water wastage occurred when there is unclosed and running faucet, followed by some 31 per cent of respondents are of opinion that the wastage occurred when there is a pipe leakage and water theft, 12 per cent of respondents think that wastage occurred due to overuse or careless in using water, and the rest 6 per cent of respondents mention the lack of awareness or the 'don't care' attitude (Table 3.5). From the responses, we can say that water wastage occurred is mainly due to human being's behaviour, attitude and awareness in conserving water.

Table 3.5: Percentage Distribution of Respondents by Situation Where Water Wastage Could Occur

Situation	Per Cent	Number of Cases
Unclosed and running faucet	51.4	(330)
Non-revenue water loss	30.7	(197)
Overuse or careless in using water	11.8	(76)
Lack of awareness or 'don't care' attitude	6.1	(39)
Total	100.0	(642)

News Straits Times (21 March 2001) commented it is a crying shame that we have to put up with dirty water, water shortages and rationing when we are in a tropical country with abundant rainfall. A clean and uninterrupted water supply is essential for progress. However, water supply is also increasingly polluted by untreated sewage, industrial discharge, leakage from oil storage tanks, mine waste, residues of agricultural fertilizers and pesticides (News Straits Times, 21 March 2001).

Water problems are related more to mismanagement than scarcity (WWF, 2003). Thus, there are undoubtedly some 33 per cent of the respondents believed that the interruption of water supply is due to the poor management and maintenance of State Water Department (JBA), in terms of pipe repairs, pipe flushing and pipe fixing (Table 3.6). Some 29 per cent of respondents would say the water supply has been disrupted through pipe leakage. Population Report (1998) also mentioned that much of the municipal water supply is lost before it can reach consumers. One-quarter of respondents believed the low water level in the dams is the cause. This may partly due to low rainfall and overdrawn of water.

Table 3:6 Percentage Distribution by Causes of Disruption of Water Supply

Reasons	Per cent	Number of Cases
The management and maintenance of State Water Department (JBA)	33.1	(212)
Pipe leakage	28.9	(185)
The low level of water in the dams	25.2	(161)
Poor Coordination between State Water Department and Public Work Department (JKR)	6.3	(40)
Lack of awareness in saving water	4.2	(27)
Others	2.3	(15)
Total	100	(640)

According to 6 per cent of respondents, lack of the coordination between State Water Department and Public Work Department (JKR) caused the water disruption (Table 3.6). Only 4 per cent of respondent would think that the lack of awareness in saving water is the main reason for disruption of water supply.

Educating the public to save water is a difficult task but it is an unavoidable challenge as our country's water resources are heading towards total depletion (New Straits Times, 21 March 2001). Mass media plays an important role in promoting the awareness in conserving water. About half of the respondents mention that mass media could play significant role in cultivating the awareness. Some 30 per cent of respondents acknowledge the importance of environment education as a vital link to strengthen the awareness of the Malaysian public, and the rest, 27 per cent of them believed that the awareness campaign could increase the awareness of water conservation among the people (Table 3.7).

It is interesting to note that more female than male respondents are of opinion to increase the water conservation awareness through mass media (Table 3.7). While the male respondents are more likely to suggest awareness campaign and formal education than female respondents.

There is a significant different among the ethnic groups on the appropriate ways to increase awareness in conserving water. Malay respondents are more likely to choose awareness campaign than Chinese, Indians and Others, where about half of Chinese and Indians and Others choose mass media as an instrument to increase awareness in conserving water

Younger people (less than 40 years old) are more likely to say that awareness campaign is the appropriate way to raise awareness in conserving water than those in older groups (40 years old and above) (Table 3.7). On the contrary, slightly higher

percentage of older people think that the appropriate way to improve the awareness in conserving water is through mass media, and the more educated the respondents, the more likely to mention the appropriate way to increase awareness is through formal education.

Table 3.7: Percentage of Respondents Who Mention the Following Methods as the Appropriate Ways to Increase Awareness in Conserving Water by Selected Variables

Variables	Selected Methods			n
	Through Awareness Campaign	Through Mass Media	Through Formal Education	
Gender*				
Male	28.5	45.0	31.9	(298)
Female	25.3	54.9	29.6	(348)
Ethnic Groups*				
Malay	45.6	40.0	21.1	(90)
Chinese	22.7	52.3	33.1	(493)
Indians and Others	31.7	49.2	25.4	(63)
Age Group				
< 30	29.4	51.5	32.0	(231)
30-39	31.7	45.2	33.3	(126)
40-49	23.8	49.5	24.8	(101)
50+	21.7	52.2	30.4	(184)
Education				
No Schooling and Primary	20.0	56.7	26.7	(90)
Secondary	28.6	46.6	30.0	(283)
Tertiary	27.1	52.0	32.6	(273)
Total	26.8	50.3	30.7	(646)

n = Number of cases

* Significant at 5 per cent level.

3.3 QUALITY OF WATER

Department of Environment reported that from 1996 to 1997 the number of clean rivers dipped sharply from 42 to 24 (Department of Environment, 1999; Sahabat Alam Malaysia, 2001). Thus, when respondents were asked on the main cause of drinking water pollution, some 44 per cent of the respondents believe that the wastes from industries and domestic are the main cause (Table 3.8).

Table 3.8: Percentage Distribution by Causes of Drinking Water Pollution

Causes	Per Cent	n
Wastes from industries and domestic	44.2	(284)
Management and infrastructure of State Water Supply Department (JBA)	29.4	(189)
Water processing	9.3	(60)
Chlorine	7.9	(51)
Lack of awareness from society	7.0	(45)
Acid rain	2.2	(14)
Total	100.0	(643)

n = number of cases

About 29 per cent of the respondents blame the management and infrastructure of State Water Supply Department (JBA) such as, old piping is the main cause. Failure to completely flush the pipes after repair works would result in consumers receiving turbid water through their taps soon after the water is released. Proper sanitary procedures must be adhered to during pipe repairs including chlorine disinfections. Failure to maintain the system through periodic cleaning of service reservoirs and

flushing of the distribution pipes, especially at dead ends of pipe systems where there is a tendency for build-up of sediments (New Straits Times, 7 April 2002).

Some 8 per cent of respondents view that Chlorine is also one of the pollutants even though Chlorine is used as disinfectant. However, high content of chlorine residual may bring the unfavorable taste to drinking water.

The supply of freshwater is shrinking because many freshwater resources have become increasingly polluted. One of the killers of freshwater resources is the battery. Most Malaysian throws their batteries away together with their household waste. These batteries are hazardous waste, and they eventually end up in landfills or incinerator where their contents leak into soil, groundwater, streams, rivers, and ultimately, the water we drink and consume daily. The batteries contain high amount of heavy metal (such as, lead, nickel, mercury, cadmium and others) which present a hazard if released into the environment. For example, cadmium, highly toxic heavy metal that can causes chronic health problems such as vomiting, gastrointestinal tract and liver disorders, anaemia and cancer (The Star, 4 March 2003). According to Singapore's Institute of Environmental Science and Engineering, just one cadmium battery can pollute 600,000 litres of water, or about a third of an Olympic-size swimming pool.

In Malaysia, approximately 153 million batteries were sold in 1998 and it is about 8.9 batteries consumed per person. Among them, 200,000 pieces are used annually to power compact disc players, while personal stereo sets and stereo players

consumed 215,000 and 485,000 respectively (Environmental Protection Society Malaysia, 1999). At present, there are no or minimal recycling facilities that can practically and cost-effectively recycle or reclaim batteries.

The respondents were asked on the quantity of batteries used by them and their households. Some 43 per cent of respondents do not use a battery in a month (Table 3.9). About 30 per cent of respondents report that their households did not consume any battery in a month. The respondents may not answer the question correctly or misunderstand the question such as the fact on the particular month they did not buy new batteries. In fact, batteries have become an integral of our daily living.

The average individual consumption is 1.6 batteries per month or 19.2 batteries per year and household consumption is 3.3 batteries per month or 39.6 batteries per year. The individual consumption is twice of the national batteries consumption in 1998. Table 3.9 shows that some 20 per cent of households are using the batteries heavily.

Table 3.9: Percentage Distribution Respondents by Batteries Consumption

No. of Batteries consumed monthly	0	1	2	3	4	5	6+	n	Do not know
Individual	43	17	19	5	9	3	4	608	39
Household	30	10	13	8	10	8	21	618	29

n=number of cases

3.4 ATTITUDE TOWARDS WATER LEAKAGES

It is very important to know how individual assumed his or her role in conserving the water, as this would eventually affect the behaviour and action. In this study, the reaction of respondents towards water leakage will be used as the measurement of the attitude of respondents. According to New York City's Department of Environmental Protection, there is plenty of water wasted if our faucet or tap leaks. For example, leaking toilet would cause about 1136 litres (250 gallons) of water wasted per year or if the situation is constantly running, 27,270 litres (6,000 gallons) of water will be wasted per year (Table 3.10). Let us imagine, if a faucet drip fills an 8oz. cup in an hour (or 3600 seconds); if this is true, 7 litres (1.5 gallons) of water would be wasted in a day; 205 litres (45 gallons) a month, or 2,490 litres (547.5 gallons) a year. Just picture 2,490 litres (547 gallon) of Milo jugs sitting in front of you and all from one tiny little drip. Thus, reaction and attitude toward water leakage, to certain extent, would review the level of awareness of the respondents. Two questions were asked to elicit the respondents' awareness in conserving the water in their living place and at public places.

Water leakage at home, including faulty faucets and toilets are responsible for significant water losses. Thus, leak repair is an area that warrants evaluation and potential investment reached by a number of studies in United States (U.S. Department of Housing and Urban Development (USHUD) 1984; Mayer et al. 1999). Residential

leaks rates have been documented in a number of studies⁴. The early USHUD study (1984) estimated leakage to be 5 to 13 per cent of total indoor water use. The Residential End-use of Water (REUW) study found average leakage was 12.7 per cent of indoor use and the highest leakage rate is 24.5 per cent. In five of their study regions in United States, per capital leakage rates exceeded total faucet water use. DeOreo et al. (1996) analyzed 16 single-family homes in Boulder County, Colorado and found that leaks averaged to 11.5 per cent of indoor water use. In all these studies, toilets are the leading “leakers” (Glecik et al, 2003).

Table 3.10: Leak Factsheet

Leaking Faucets	Amount of Water Wasted (per year)	
	Gallons*	litres
Slow drip	36	164
Steady drip	180	818
One-quarter open	684	3,109
Half open	1,620	7,364
Fully open	3,600	16,364
Leaking Toilets		
Seeping	30	136
Leaking	250	1,136
Constantly running	6,000	27,273

*1 litres = 0.22 gallons

Source: New York City Department of Environmental Protection as quoted in Utusan Konsumer, 1998.

When the respondents were asked whether any water leakage happened at their houses, about one-third of the respondents said so and 61 per cent of them will call the

⁴ These studies do not differentiate between indoor and outdoor residential leaks. All leaks included as indoor water use, presented as the percentage of indoor use.

plumber immediately (Table 3.11). Some 23 per cent of them would delay it until they have time to call the plumber and 16 percent of the respondents are ignoring the situation.

Table 3.11: Percentage Distribution by Whether Respondents Have Seen Pipe Leakage at Their Own Residents and Their Reaction

Respond and Reaction	Per cent	Number of Cases
Yes	34.2	(210)
Ignore it	15.6	(33)
Call the plumber immediately	61.1	(129)
Call the plumber when available	23.2	(490)
No	65.8	(426)
Total	100.0	(636)

Females are more likely to call the plumber immediately than their male counterparts (Table 3.12). Some 67 per cent of female respondents take immediate action to call the plumber compared to about 56 per cent of the male respondents. Chinese is more likely to ignore the leaks compared with non-Chinese. Those who aged 30 years old and above are more likely to take action to repair the leakage. However, there is no significant different across gender, age groups and ethnic groups.

One can see that education is playing an important role in affecting the response of the respondents towards water leakage. Respondents with primary education or less are about three times more likely than those with secondary education and higher to ignore the water leakage in their own living place. It is interesting to note that higher percentage of respondents with secondary education are taking immediately respond

compared with those respondents with tertiary education. The lower income respondents are also more likely to ignore the leakage situation compared with those with higher income. This may partly due to the low awareness among the lower income group.

Table 3.12: Percentage of Respondents Who Responded to the Water Leakage in the Own House by Selected Socio-Economic Variables

Characteristics	Ignore it	Call the Plumber Immediately	Call the Plumber When Available	n
Gender				
Male	13.4	56.3	30.4	(112)
Female	18.2	66.7	15.2	(99)
Ethnic Groups				
Chinese	17.9	61.6	20.5	(151)
non-Chinese	10.0	60.0	30.0	(60)
Age Group				
< 30	18.2	57.1	24.7	(77)
30-49	13.1	63.2	23.7	(76)
50+	15.8	63.2	21.0	(57)
Education Level *				
No Schooling and Primary	35.5	48.4	16.1	(31)
Secondary	12.9	67.7	19.4	(93)
Tertiary	11.5	58.6	29.9	(87)
Income Group *				
<2000	26.7	66.7	6.7	(30)
2000+	12.1	63.6	24.2	(66)
Total	15.6	61.1	23.2	(211)

n = number of cases

Income group = 96 cases

* Significant at 5 per cent level.

Reporting the water leakage is one of the most effective ways in preserving the clean water. Every year plenty of the non-revenue water (NRW) has been reported. Based on national NRW study, in 1987 the NRW reported is 1,661,184 m³ per day but the volume has been increased to 3,041,191 m³ in 1998 (Public Works Department, 1998). One of the factors contributing to NRW is water leakage. Non Revenue Water of Selangor in 1998 is 30.6% of total consumption.

Some 61 per cent of the respondents had seen pipe leakage at roadside or public places. About two-thirds of them did not take any action (Table 3.13). Some 22 per cent of those who have seen the pipe leakage reported to the JBA, 13 per cent of them informed other persons such as, related authorities, Petaling Jaya Municipal Council (MPPJ), contractor, plumber, parents, residents and friends. The high percentage of not reporting deserves attention from the authority concerned. The slowness or no action has been taken by the authority concerned after several calls may deter people from reporting pipe leakage at public places.

Table 3.13: Percentage Distribution by Whether Respondents Have Seen Pipe Leakage at the Roadside or Public Places and Their Reactions

	Per cent	Number of Cases
Yes*	61.1	(395)
Leave it	65.7	(255)
Report to JBA	21.6	(84)
Inform other persons	12.6	(49)
No	38.9	(252)
Total	100.0	(647)

* 7 respondents do not give their reaction.

Table 3.14 shows that some 66 per cent of males and females ignored the leaks at the roadside or public places. Male respondents are more likely to report the leakage to JBA than female respondents, who tend to inform others.

Among the ethnic groups, Chinese tend to ignore the leaks compared with other ethnic groups. Malays are more obligated to report to JBA compared with Chinese, Indians and Others.

It is interesting to note that the younger the age the more likely to ignore the leaks. Older people are more assumed responsibility to report the leaks to the JBA compared with younger people; 30 per cent of those above 50 years compared to 15 per cent of those 30 years and below. The different reaction across age group is significantly different at the 5 per cent level.

Education does not seem to play a vital role in affecting the response of respondents towards leakage at public places. Some 70 per cent of those with tertiary education did not take any action. However, respondents with secondary education or higher are more likely to report to JBA. The different reaction across educational levels is significantly different at the 5 per cent level.

Table 3.14: Percentage Distribution of Respondents Who Have Seen Water Leakage in the Public Places by Their Reaction by Selected Socio-Economic Variables

Characteristics	Respond to Water Leakage at Roadside/Public Places			n
	Ignored	Report to JBA	Inform Other Person/s	
Gender**				
Male	66.0	24.6	9.4	(191)
Female	65.5	18.8	15.7	(197)
Ethnic Group				
Malay	56.1	28.8	15.2	(66)
Chinese	68.6	20.2	11.1	(287)
Indians and Others	60.0	20.0	20.0	(35)
Age Group*				
< 30	74.5	15.4	10.1	(149)
30-39	69.5	22.0	8.5	(82)
40-49	61.7	25.0	13.3	(60)
50+	52.6	29.5	17.9	(95)
Education Level*				
No Schooling and Primary	65.1	11.6	23.3	(43)
Secondary	61.3	25.4	13.3	(173)
Tertiary	70.3	20.3	9.3	(172)
Marital status*				
Single	73.1	16.9	10.0	(160)
Currently married	60.5	25.0	14.5	(228)
Income Group**				
<2000	66.1	14.5	19.4	(62)
2000 - 4999	64.0	29.1	7.0	(86)
5000+	66.0	25.5	8.5	(47)
Total	65.7	21.6	12.6	(388)

* Significant difference at 5 per cent level.

** Significant difference at 10 per cent level.

n = number of cases.

Age group = 386 cases.

Income group = 195 cases.

Those who currently married appear to be more aware than single respondents. For example, one quarter of the currently married respondents reported the leaks to JBA compared to 17 per cent of single respondents. And higher percentage of single respondents than married respondents ignored the leakage at roadside or public places. Those respondents in the income group of RM2,000 or more are more likely to report the public water leakage to JBA compare with respondents with income less than RM2,000, who tend to inform others about the leakage. The different reaction across martial status and income group are significantly different at the 5 per cent level and 10 per cent level respectively.

3.5 MULTIVARIATE ANALYSIS

In measuring the level of awareness of respondents, reporting water leakage at the public place is used as the indicator. We assume that the awareness of respondents would stimulate his or her to take some action such as, report the public water leakage to State Water Supply Department (JBA) or other related parties. Logistic regression model is used to estimate the effect of the some selected demographic characteristics and water conservation perception and practice of the respondents towards the public water leakage reporting.

The dependent variable is defined as follow:

REPORT is 1 if respondents have taken one of the following action; report to the JBA or other related persons dealing with water leakage at public place, 0 if respondent ignored the situation.

The explanatory variables in the estimated models are defined as follows:

- SEX is a dummy variable that takes the value of 1 if the respondent is a male, 0 for female;
- AGE representing the age of respondent;
- TEDU representing education level of the respondents; 1 if respondent has attained secondary education and higher, 0 otherwise;
- CHINESE is a dummy variable that takes the value of 1 for Chinese, 0 for non-Chinese;
- WFTURE representing perception of respondent on the possibility of water shortage in future, 0 otherwise.

The result of the logistic as follows:

$$P(\text{REPORT}=1) = 1 / (1 + e^{-z})$$

Where

$$Z = -2.554 + .022\text{GENDER} + 0.029\text{AGE}^* - 0.515\text{CHINESE}^* + 0.269\text{EDU} + 1.008\text{WFTURE}^*$$

* Significant at 5 per cent level.

Table 3.15: SPSS Output of the Variables in the Equation

Coefficient	B	S.E.	Wald	df	Significant	Exp(B)
Constant	-2.554	0.652	15.329	1	0.000	0.078
GENDER	0.022	0.227	0.009	1	0.922	1.022
AGE	0.029	0.008	12.730	1	0.000	1.030
CHINESE	-0.515	0.249	4.281	1	0.039	0.598
EDU	0.269	0.378	0.507	1	0.476	1.309
WFUTURE	1.008	0.411	6.024	1	0.014	2.740

The signs of coefficient of variables are consistent with the expectation except, gender, age, and educational level (Table 3.15). The positive coefficient of a variable indicates higher possibility of reporting the water leakage at public places or otherwise.

Males appear to be more likely to take action dealing with public water leakage compared with females. The log odds of reporting water leakage are 0.022 higher for males than females. The log odds of reporting public leaks are 0.269 higher for respondents with secondary educational level and above than those respondents with non-schooling and primary school level. However, the differences in log odds for the categories of gender and educational level likely do not differ from zero in the population or there are not significant at the 5 per cent level. Thus, we found no evidence that gender and educational level are related to the reporting of public water leakage.

AGE is significant at $\alpha=0.05$. The positive relationship (0.024) shows that the older the respondents, the more likely they report on the public water leakage. For

each additional year of age a person has, his or her odds of reporting the public water leakage by a factor of 1.030. The variable, CHINESE is also significant with a negative coefficient. The odds-ratio for CHINESE indicates that Chinese are 0.598, about 3/5 as likely to report the public water leakage in comparison to non-Chinese. That means Chinese are less likely to report the public water leakage than their other counterparts.

The odds ratio for WFUTURE is 2.938. This means that those respondents who think that there is possibility of water shortage in future are nearly trice as likely to take action in dealing with public water leakage.

The model log likelihood function times -2 equals 468. The model Chi-square is 24.895 (from the 'Omnibus Tests of Model Coefficients' table) is significant at 5 per cent level, implying that this model is useful (Sweet, 2003). The Cox and Snell measure equals 0.063 and the Nagelkerke adjustment raises the measure to 0.087.

For illustration of the model, a Chinese aged 60 years old believed that there is the possibility of water shortage in future has a 42 per cent probability of reporting the water leakage at public place. The probability is reduced to 0.209 if he does not convict that there is the possibility of water shortage in future. Table 3.16 shows the estimated probability of reporting water leakage at public place by some combination of the significant explanatory variables, controlling for other variables in the model.

Table 3.16: Estimated Probability of Participation in Reporting Water Leakage at Public Place by Various Characteristics

No	Explanatory Variables			Estimated Probability
	AGE	CHINESE	WFUTURE	
1.	20	Non-Chinese	No	0.122
2.	20	Non-Chinese	Yes	0.276
3.	20	Chinese	No	0.077
4.	20	Chinese	Yes	0.185
5.	60	Non-Chinese	No	0.307
6.	60	Non-Chinese	Yes	0.548
7.	60	Chinese	No	0.209
8.	60	Chinese	Yes	0.420

3.6 CONCLUSION

Generally, most respondents acknowledge the water as vital resource and there is a possibility of clean water shortage in future. Wasting behaviour, attitude and awareness in conserving water are the factor haunt the worry of respondents on the water wastage. To increase the awareness in water conservation, mass media is the most effective mean. Then, follow by the formal education and then awareness campaign.

Industrial and household wastes are the main causes in deteriorating the quality of water. The management and infrastructure of the Water Work Department are also one of the causes of drinking water pollution.

Reaction towards water leakage in own home and public place would review the attitude of respondents towards water conservation. Majority of the respondents have not seen any pipe leakage at their own residents. However, one-third of respondents would take immediate action to solve the problem by calling the plumber when there is a pipe leakage at home. Education and income background affect the response of the respondents towards water leakage at their own resident. Less educated respondents are more likely to ignore the water leakage at home than more educated respondents. The lower income respondents are also more likely to ignore the leakage situation compared with those with higher income.

Most respondents have seen the pipe leakage at the roadside or public places but only one-third will take action by reporting. Gender, educational level, marital status and household income are influencing respondents' respond towards pipe leakage at the roadside or public places. Single young male (aged 30 years old and below) with tertiary education and lower household income (less than RM2000 per month) is more likely to ignore the situation. On the other hand, married male (aged 50 years old and above) with secondary education and middle household income (RM2000 to RM4999) is more likely to report the pipe leakage at the roadside or public places to Water Supply Department (JBA).

Most of the respondents uphold the preciousness of the water but fewer respondents willing to take action to report the water leakage at public place shows the gaps that remain in getting awareness of water conservation across to the general public.