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Survey Report

Understanding the Preconceptions of Local Citizens in Tuen Mun Regarding Waste Management





Published by

**Office of Service-Learning,
Lingnan University**

**September, 2011
Printed in Hong Kong**

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ABSTRACT

As a highly developed city, it is surprising to find that proper waste management behavior has not yet been well-established in Hong Kong. In order to investigate the causes of this phenomenon, a study with a sample size of 1,001 was conducted. It has been found that most of the respondents were willing to participate in waste separation at the source, and the majority of them to separate waste were because of environmental protection reason, which contradicts the phenomenon seen in the landfill. The gap between the finding of the study and reality may be due to the fact that the respondents interviewed in this study were relatively young (mean age = 28.63), and most of them were students (60.2%). Therefore, the sample size may not be reflective of all Tuen Mun residents. However, it is encouraging to find that proper waste management behavior has been widely established among the younger generations in Tuen Mun. This study found that sex, age, occupation, situational responsibility, and accessibility to recycling facilities all play a significant role in causing pro-environmental behavior. This study also revealed that mass media, both print and digital, was widely perceived by the public as the most effective channel to promote proper waste management behavior.

中文概要

屯門區居民廢物管理意識意見調查

本研究是希望了解屯門區居民對廢物管理意識，研究調查在區內各屋邨和學校進行，1001 名市民接受訪問，超過九成為區內居民，超過六成受訪者為學生及家庭主婦。

結果顯示，七成受訪者都知道屋邨內的廢物管理設施位置所在，當中有超過八成認為設施方便使用，但有三分之一的受訪者覺得設施並不足夠。近八成受訪者曾作家居廢物回收，其主要原因為保護環境資源、清潔家居雜物、減輕堆填區的壓力等。至於沒有作回收的主要原因是家中沒有足夠空間儲存廢物、回收分類費時和麻煩等。其次，本研究亦了解受訪者對環境的價值觀及他們的環保行為。他們都關心環境問題並認同廢物管理的重要性；環保行為則以使用循環再用產品。環保宣傳方面，他們認為電視媒體、報紙等最為有效，而環境意識影響他們的行為，主要是來自家人、朋友、公眾人物。

總結以上結果，我們建議在屋邨增加更多大型回收設施。強化行為可以公眾人物作宣導環保意識入手，本研究主要受訪者為學生，而家人、老師及朋友的影響最為直接，故此，政府有關部門、機構或學校可考慮以三者為目標，舉行一些讓他們一起參加的環保活動。

CHAPTER 1

INTRODUCTION

1.1 The Waste Management Dilemma in Hong Kong

1.1.1 The Hong Kong Context

As a highly developed city, over 50% of the population in Hong Kong at least completed secondary school (HKC&SD, 2009). Concepts related to sustainable-living have been introduced to the primary and secondary school curriculums and explained through regular courses. Moreover, environmental education has also been informally introduced in some schools through extracurricular activities, such as environmental groups or societies. In spite of this, proper waste management behavior has not yet become well-established among the general public in Hong Kong.

1.1.2 The Generation of Waste in Hong Kong

According to the statistics published in 2009 by the Hong Kong Environmental Protection Department (HKEPD), there was 13,326 tpd (tonnes per day) of waste being dumped into the three strategic landfills in Hong Kong. On average, there was 8,963 tpd of municipal solid waste (MSW) being generated from the domestic, industrial and commercial sectors every day. The only way to treat the MSW in Hong Kong is to dump it into the three existing strategic landfills in Hong Kong, which are the North East New Territories Landfill

(NENT), the South East New Territories Landfill (SENT), and the West New Territories Landfill (WENT) as indicated in **Figure 1**.



Figure 1. The Locations of the Three Strategic Landfills in Hong Kong (*Source: HKEPD, 2010*)

Of that, over 67% was produced by the domestic sector at a rate of 6,015 tpd per day (HKEPD, 2009). However, an analysis of the composition of the MSW showed that it contained 3,082 tpd (51.2% of total) recyclables such as glass, metal, paper, plastics, and textiles. Due to the problem of cross-contamination, recyclables are difficult to separate from bulk waste at the point of waste collection (Chan, 1998). The dumping of these recyclables into the landfill not only wastes resources, but also shortens the lifespan of the existing landfills and leads to other problems. Therefore, reducing the amount of waste generated by the public is an indispensable part of the overall waste management action agenda.

One of the most significant impacts is the production of greenhouse gases (GHG), mostly methane, when the organic materials undergo decomposition by the anaerobic activities of microbes. The emission of GHG from landfills, including both

operating and restoration sites, contributed to 5% of the total GHG emission in Hong Kong (HKEPD, 2010). Beyond doubts, the GHG will then worsen the greenhouse effect and lead to a global climate change.

1.1.3 The Tuen Mun Context

On average, 395 tpd of MSW is generated from the domestic sector in Tuen Mun, which comprised 6.57% of the total amount of domestic waste in Hong Kong. This makes Tuen Mun the third-most MSW-generating district in the New Territories and sixth among all 24 districts in Hong Kong (HKEPD, 2009). The average annual rate of increase in domestic waste in Tuen Mun District was relatively steady during the period 1999 to 2009 (**Table 1**).

Year (n)	Average Quantity Generated from Domestic Sector (tpd day ⁻¹)	Percentage of Waste Generated from Tuen Mun District (%)(a)÷(b)×100%	Relative Annual Increment $(n)^{th}(a) - (n-1)^{th}(a) \div (n)^{th}(a)$
	Tuen Mun (a)	Total (b)	
1999	503	7426	6.77
2000	488	7540	6.47
2001	492	7551	6.52
2002	444	7519	5.90
2003	436	7402	5.89
2004	363	7014	5.18
2005	353	6827	5.17
2006	376	6635	5.67
2007	366	6372	5.74
2008	388	6081	6.38
2009	395	6014	6.57

Table 1: The average amount of waste generated from domestic sectors in Tuen Mun District from 1999 to 2009. (Generated from “Monitoring of Solid Waste in Hong Kong” 1999 to 2009, HKEPD.)

1.2 The Motives behind Pro-environmental Behavior

People's reasons for exhibiting proper waste management behavior and the barriers for the people who do not act environmentally are complicated. A number of theories have been developed to try to explain this complex relationship. According to the oldest model of pro-environmental behavior developed in the early 1970s in the United States, there is a linear progression relationship between environmental knowledge and behavior. According to the linear model, environmental knowledge will lead to a person's environmental awareness and concern, which will automatically result in environmentally-friendly behavior. It has been regarded as the model of public understanding and action (Burgess *et al.*, 1998). Thus, this theory has been the basis of many communication campaigns and strategies to engage the public in environmental issues. However, Vlek and Keren (1992) have argued that affecting behavior involves a more complex mechanism. They suggested that the personal costs and benefits of pro-environmental behavior also count, in which the former will usually outweigh the latter in leading to pro-environmental action. Moreover, according to the norm activation theory (NAT) proposed by Schwartz and Howard (1984), the situational activators, such as awareness of need, situational responsibility, efficacy, and ability also promote pro-environmental behaviors.

CHAPTER 2

OBJECTIVES

There were a number of objectives for the study:

- To understand the preconceptions of local citizens in Tuen Mun regarding waste management;
- To understand the barriers to participation among residents who do not separate their waste;
- To understand the factors that have significant impacts on one's waste management behavior; and
- To find out what the public perceives as the most effective promotional channel to spread waste management concepts.

CHAPTER 3

RESEARCH METHOD

3.1 Scope of the Research

A pilot survey with a sample size of 150 was conducted to acquire a baseline of information on the preconceptions regarding waste management in Tuen Mun District. In the pilot study, twenty Lingnan University students from the course, Environmental Psychology, were recruited as volunteers to conduct a small-scale survey. In the course, students studied (i) humans' perceptions and representations of the environment; (ii) the environment's influence on human behavior and cognition; (iii) the impacts of human behavior on the environment; and (iv) shaping human attitudes toward the environment.

The twenty volunteers were given information about the local waste generation problem at the beginning of the program. Students were then divided into groups of five to design a questionnaire covering their own area of interest, yet based on the topics covered in the course. Afterwards, each group of students conducted pilot surveys with a sample size of 120–150 to acquire a baseline of information on the preconceptions toward waste management in Tuen Mun District. From the four pilot study groups, correlations have been found between knowledge, personal values, the availability and accessibility of waste management facilities, and social norms on the one hand and individual behavior on the other. The collected data was used as preliminary research for another territory-wide study conducted by 93 Green Leaders from the Waste Management

Project for Promoting Green Leaders in Tuen Mun District 2010-2011. This later study had a broader scope and a sample size of 1001; it tried to capture a clearer picture of the waste management behavior of citizens in Tuen Mun. In the territory-wide study, several areas of interest covered in the study were behavioral intention and actual environmental behavior, waste management knowledge, availability and accessibility of public waste management facilities, personal values, social norms and educational tools.

3.2 Targets

One thousand and one residents were invited for individual interviews randomly in four local secondary schools and public areas of six public estates: SMK MCF Ma Ko Pan Memorial College, Yan Chai No. 2 Secondary School, Yan Oi Tong Tin Ka Ping Secondary School, CCC Tam Lee Lai Fun Memorial Secondary School, Siu Hong Court, Fu Tai Estate, Tin King Estate Leung King Estate, Tin King Estate, and Seng King Estate. This sample consisted of 444 males (44.4%) and 557 (55.6%) females, with a mean age of 28.63 ($SD = 19.31$). Nearly three-fourths of the participants were students (60.2%) and housewives (12.2%). Over two-thirds of the participants (67.7%) completed secondary school. The majority of the participants (73.5%) had no income. They are mainly Tuen Mun District residents (91.6%).

3.3 Procedure

Tuen Mun residents were invited for individual interviews randomly at the mentioned locations. To encourage participation, a set of eco-friendly tableware was given to each participant as an incentive. The interview was conducted in Cantonese from November, 2010 to July 2011. At recruitment, participants were informed of the nature and objective of

the study, the time commitment (about 10 min), the confidentiality of the study, and how to access the study's findings.

The four-page questionnaire contained measures of behavioral intention and actual environmental behavior, waste management knowledge including availability and accessibility of public waste management facilities, personal values, and educational tools. Excluding the demographic information, there were twenty-seven questions on the questionnaire. The areas of focus and corresponding questions are presented in **Table 2**.

Areas	Variable	Questions Number
Eco-behavioral Intention	Concern for environmental issues, contribution, importance of waste management, impacts of environmental destruction, managing waste to enhance the quality of living	7 – 12, 16
Actual Environmental Behavior	Recycling behavior, use of recycled products, daily waste reduction practices	4 – 6, 17 – 19
Waste Management Knowledge	Average lifespan of landfills in Hong Kong, types of recyclables to be collected in public recycling bins, waste management strategies used in Hong Kong, waste management hierarchy	20 – 23
Public Waste Management Facilities	Availability, accessibility, sufficiency	1 – 3
Personal Values	Balance between environmental protection and social economic development, the seriousness of the waste problem in Hong Kong	13 – 15
Education Tools	Personal promotion on waste management, waste management promotional methods, most influential individual on eco-behavioral intention	24 – 27

Table 2: Areas of focus and question distribution of the questionnaire

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Description of Sample

Over three-fourths of the participants (77.1%) reported that they had the habit of separating recyclables from general garbage. **Table 3** showed the demographic distribution of people who have recycling habits and people who do not recycle. The relation between gender and recycling was significant ($\chi^2(1, N= 1000) = 11.32, p= .001$). Age ($\chi^2(5, N= 1000) = 23.25, p= .001$) and occupation ($\chi^2(3, N= 1000) = 25.63, p= .000$) were also significant factors, which corresponded with Chan's (1998) findings. The waste separators were more likely to be female; those within the age ranges of 11 – 20 and those over 51-year-old; and either students, unemployed, or retired.

	Have recycling habits (N=782)	No recycling habits (N=219)	Sig. Level of Chi-square test
Sex			
Female	457 (58.4%)	100 (45.7%)	p=.001
Male	325 (41.6%)	119 (54.3%)	
Age			
<10	48 (6.2%)	16 (7.4%)	p=.000
11 – 20	379 (49.2%)	134 (62.0%)	
21 – 30	71 (9.2%)	24 (11.1%)	
31 – 40	57 (7.4%)	6 (2.8%)	
41 – 50	85 (11.0%)	8 (3.7%)	
51+	130 (16.9%)	28 (13.0%)	
Education			
Primary School Level or below	186 (23.6%)	46 (21.0%)	n.s.
Secondary School Level	526 (67.4%)	150 (68.5%)	
University Graduate or above	68 (8.7%)	23 (10.5%)	
Occupation			
Students	434 (56.2%)	162 (74.3%)	p=.000
Housewives	108 (14.0%)	13 (6.0%)	
Employed	145 (18.8%)	27 (12.4%)	
Unemployed/retired	85 (11.0%)	16 (7.3%)	
Income			
No income	565 (72.8%)	166 (76.1%)	n.s.
5000 or below	84 (10.8%)	25 (11.5%)	
5001-10000	61 (7.9%)	11 (5.0%)	
10001-20000	51 (6.6%)	10 (4.6%)	
20001-40000	12 (1.5%)	6 (2.8%)	
40001 or above	3 (0.4%)	0 (0%)	

Table 3: Demographic distributions of people who recycle and those who do not

4.2 Opinions on Waste Management Facilities

The majority of the participants (80.4%) expressed that there were recycling facilities available in their estates. Only 8.3% of them indicated that there were no such facilities available. Out of 718 participants, the majority (83.4%) thought that the facilities were convenient. Further, slightly lower than two-thirds of the participants (63.2%) thought that those facilities were sufficient. Still one-third of the participants (33.7%) thought that the available facilities were insufficient (**Table 4**).

	Frequency	%
Availability of recycling facility (n=1001)		
Yes, I know where it is	718	71.7
Yes, not sure where it is	87	8.7
No recycle facility	83	8.3
Not sure	113	11.3
Accessibility to recycling facility (n=718)		
Convenient	599	83.4
Inconvenient	118	16.4
Refuse to answer	1	0.1
Sufficiency of recycling facility (n=888)		
Sufficient	561	63.2
Insufficient	299	33.7
Refuse to answer	28	3.2

Table 4: Percentage distribution on Waste Management Facilities

4.3 Reasons to Recycle

Participants were allowed to select multiple choices to elaborate their reasons for recycling. **Figure 2** shows that most participants carry out waste separation at home because they want to protect the Earth's resources, as well as cleaning up at home and relieving the pressure at landfills. Other minor factors were helping people in need, the convenience of recycling facilities, family/peer influence, and earning extra income respectively. Participants seem to be concerned about environmental protection. Thus, situational factors seem to outweigh personal values and social norms in driving this particular behavior.

Participants who did not carry out waste separation were asked to state their reasons for not doing so. **Figure 3** reveals the major reasons. They claimed that they felt bothered by the trouble of recycling and that it was a waste of time to carry out such behavior. A small group of them pointed out that there was no room to store the separated waste in their home.

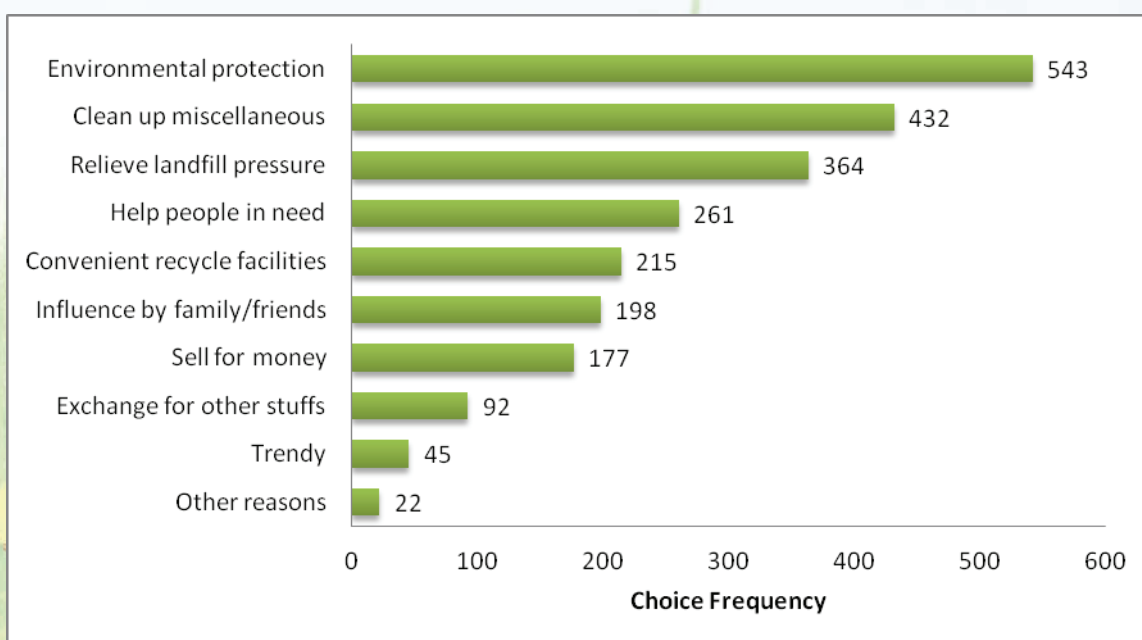


Figure 2: Reasons for Recycling

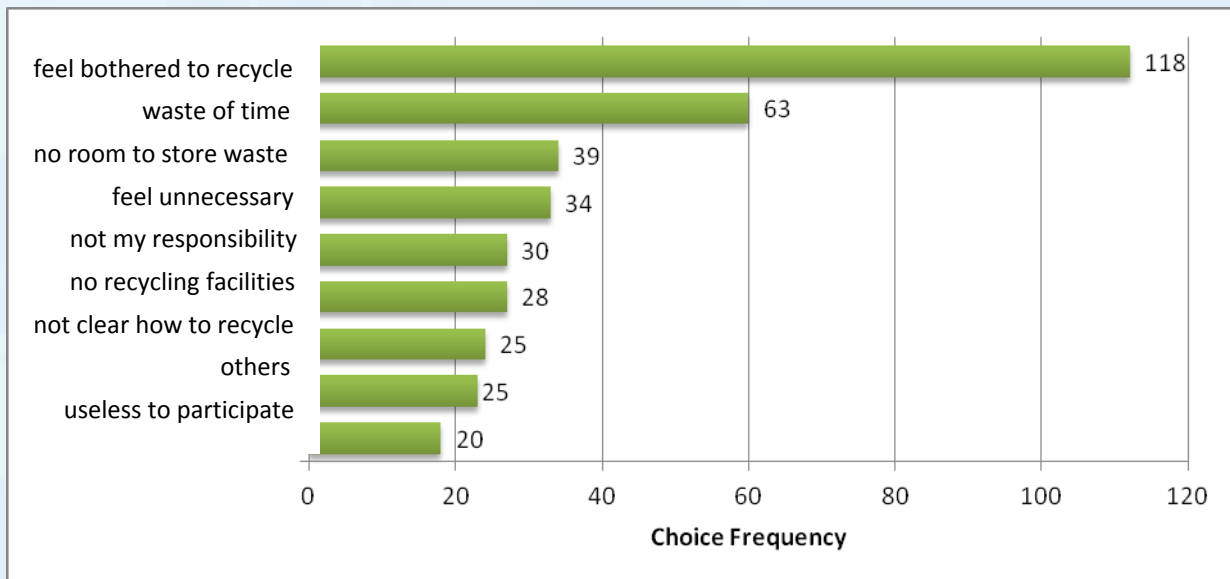


Figure 3: Reasons for not Recycling

In addition, the mean score for the domains of possessing values of recycling was 7.44 ($SD=1.30$) and the mean score for domains of tending to have recycle behavior was 7.72 ($SD=1.72$). **Table 5** and **Table 6** show the mean score distributions of these two aspects. Both domains were significantly correlated ($r = .557, p=.000$). A positive correlation indicated that, for those participants who were more concerned about the environment and waste management problems, they are more willing to exhibit eco-friendly behaviors, such as waste reduction and waste separation at home.

	N	Mean	SD
• I am concerned about environmental problems.	1001	7.14	1.98
• I think I can make a contribution to environmental protection.	1001	6.52	2.00
• I think waste management is important.	1001	7.96	1.88
• I think environmental pollution has impacted the environment and the health of our next generation.	1001	8.16	1.89
• I think technology can solve environmental problems.	1001	6.09	2.45

• I think I can relieve environmental problems through personal action.	1001	7.54	1.91
• I think protecting the environment is more important than social financial development.	1001	7.14	2.12
• I think Hong Kong has a waste management problem.	1001	8.20	1.92
• I think there is an urgent need to solve our waste management problem.	1001	7.93	2.13
• I think waste management can enhance the quality of life .	1001	7.69	1.89

Table 5: Mean score of possessing values of recycling

	N	Mean	SD
1. I tend to use recyclable products.	1001	7.37	2.02
2. I always use eco-friendly water bottles.	1001	7.83	2.26
3. I always use eco-friendly bags.	1001	7.97	2.16

Table 6: Mean score of tending to have recycle behavior

However, there was a non-significant correlation of $.04$ ($p = n.s$) between knowledge and behavior. For those participants who had considerable knowledge about proper waste management practices, such as types of recyclables that can be collected in public recycling bins and waste management hierarchy, did not necessarily choose to recycle at home. Therefore, the results suggested that the Buress's linear model (**Figure 4**) of pro-environmental behavior is not applicable to the residents of Tuen Mun. On the other hand, the study revealed that gender, age, occupation, situational responsibility, accessibility of recycling facilities play a more significant role in affecting one's behavior.

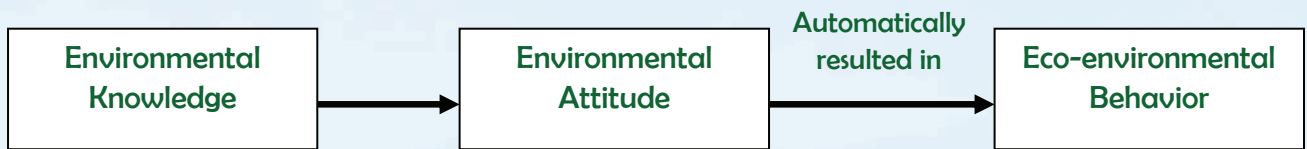


Figure 4: Early Models of Pro-environmental Behavior (adopted from Kollmuss and Agyeman (2011), with modifications)

4.4 Environmental Education

In this section, the role of different sources of environmental information and parties has also been investigated. Participants were asked to rank the most effective promotion method. Rank 1 is the most effective way to promote the concept of waste management, and Rank 5 is the least effective method. Each rank revealed the top three methods chosen for comparison. **Figure 5** showed that mass media, including TV and radio, schools and the Internet were the most effective ways to promote the concept of waste management. On the other hand, advertisements on public transportation and posters in estates are not effective ways to promote the idea of proper waste management.

Furthermore, participants were asked to rank the people who are the most influential to them regarding issues of environmental protection. The study revealed that family and peers have a great influence on environmental intentions. Some respondents also expressed that teachers were also important. It is interesting that public figures were both ranked on top and bottom (**Figure 6**).

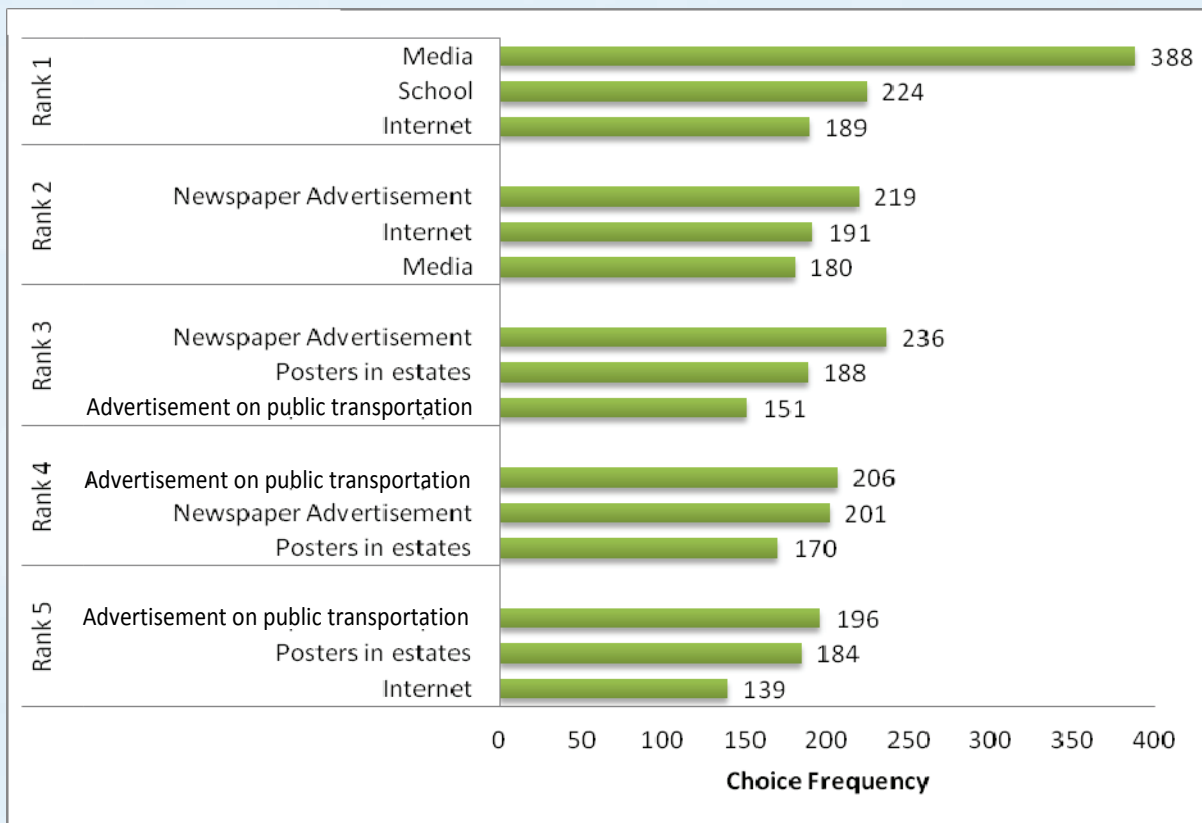


Figure 5: Sources of Information on Waste Management Issues

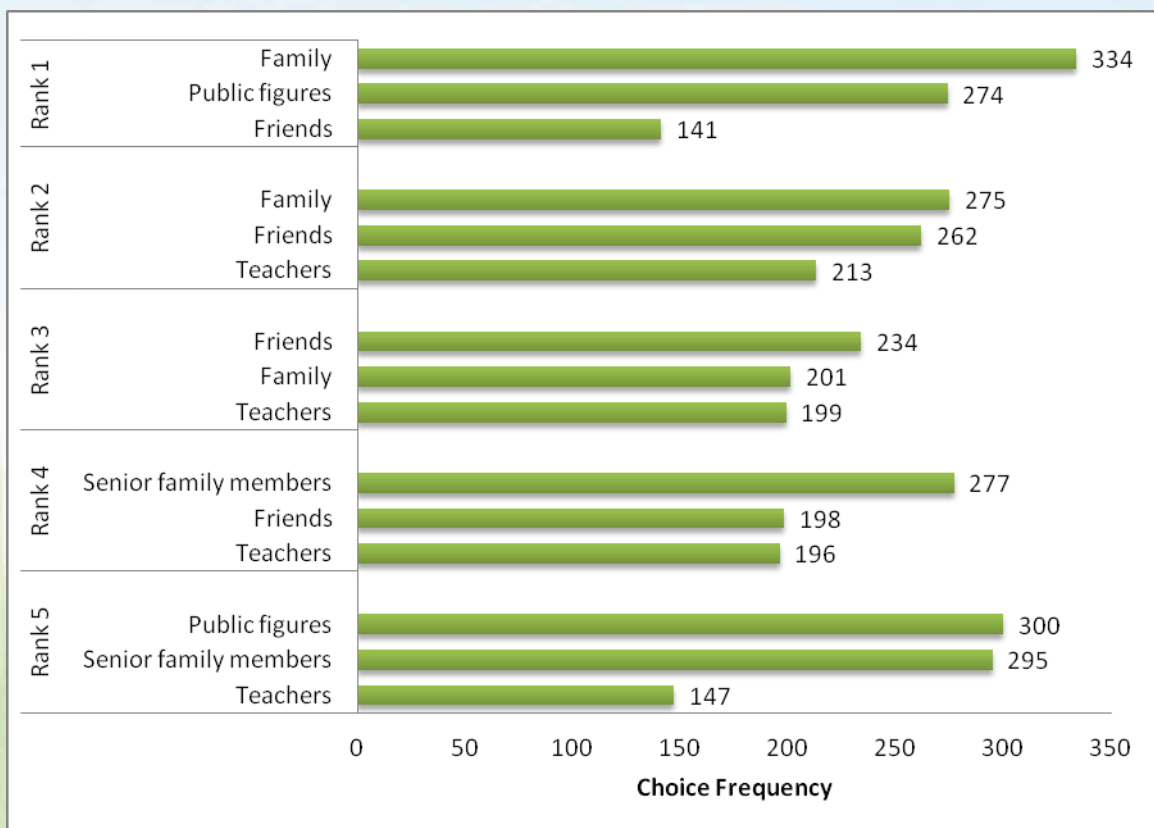


Figure 6: Role of Different Parties in Affecting One's Environmental Behavior

4.5 Discussion

Over the years, government has put great effort on improving our living environment and tried to reduce the amount of daily waste by educating the public. The introduction of categorical waste management is commonly found in all public housing estates and some private housing areas. In this study, it is encouraging to see that a significant amount of participants (77.1%) have recycling habits in Tuen Mun District. They are mostly influenced by the mass media, family, and friends. Chan, K. (1998) initially found that mass media is an effective way to promote environmental protection in Hong Kong. Our study also suggests that the Environment Bureau should keep using mass media to promote the message of environmental protection and the importance of waste management to the public. Schools are the best place to deliver the message of waste management; the integration of environmental education into the liberal arts curriculum provides opportunities for students to have a better understanding of these issues. In addition to schools, the Internet is also becoming popular in our society as a low-cost and effective way to approach the public, especially younger segments of the population. Government departments should use the internet as well to promote recycling and also organize more environmental protection activities for teenagers, which gather utilize the positive influence exerted by their family, teachers and friends.

There are two limitations that need to be acknowledged and addressed regarding this study. First, the sampling method could be modified for future studies. Random interviews were carried out in the street and at schools resulting in over half of the respondents in this study being students. Second, the target interviewees were limited to those who are living in the public estates. Those who are living in remote villages or private housing estates were most likely excluded from this study; our study did not accurately reflect the whole picture of waste management in Tuen Mun. A stratified sampling method (e.g. geographical areas, age-groups, occupation-groups) should be used in order to cover different kinds of participants in the study; this would make the conclusions more credible.

CHAPTER 5

CONCLUSION

It has been found that most of the respondents were willing to participate in waste separation at home, and the majority of them were willing to do so in order to protect the environment. This study revealed that gender, age, occupation, situational responsibility, accessibility of recycling facilities play a significant role in the development of pro-environmental behaviors. In this study, it also revealed that mass media, both print and digital, was widely perceived by the public as the most effective channel to promote proper waste management practices. Also, there should be various environmental protection activities for the younger generations and they can participate with their family, teachers and friends.

CHAPTER 6

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屯門區廢物管理綠色領袖計劃
Waste Management Project for Promoting
Green Leaders in Tuen Mun 2010-2011

主辦機構 Organizer:

協辦機構 Co-organizers:

贊助機構 Funding:

