

# Influence of socio-economic factors on street litter generation in the Middle East: effects of education level, age, and type of residence

Street littering is considered an important environmental health issue in the Middle East. This problem is growing steadily and is attracting great concerns within the communities. The purpose of this paper, which focuses on Nablus district (Palestinian Territory), is to measure the perception and opinion of residents toward littering, in addition to studying prevailing attitudes and practices on littering. This was achieved using an interview survey approach. The influence of three socio-economic factors; level of education, age, and type of residence, on the littering behaviour of individuals was studied. As a result, possible remedial actions have been suggested. The data presented in this work can be considered as one piece of information, which can be compiled with other future data to design an effective litter control programme for Middle Eastern countries.

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## Introduction

Litter can be defined as 'any piece of glass, plastic, paper, metal, cloth, rubber, food, or food by-product which is thrown away in public places outside waste collection containers. Intact toys, wood, rocks, broken pieces of asphalt, garbage containers, or garbage in containers are not considered litter' (Schnelle *et al.* 1980). According to another definition by New South Wales Environment Protection Authority litter includes 'any solid or liquid domestic or commercial refuse, debris or rubbish and, without limiting the generality of the above, includes any glass, metal, cigarette butts, paper, fabric,

wood, food, abandoned vehicles, abandoned vehicle parts, construction or demolition material, garden remnants and clippings, soil sand or rocks, and any other material, substance or thing deposited in a place if its size, shape, nature or volume makes the place where it is deposited disorderly or detrimentally affects the proper use of that place, whether or not it has any value when or after being deposited in or on the place' (New South Wales Environment Protection Authority 2003).

Three types of negative impacts are associated with litter, none of which are easily quantifiable. One impact is aesthetic

blight. Although there is little disagreement with the fact that more litter is uglier than less litter, little work has been done to translate this fact into dollars. The second type of impact is medical. Armstrong & Molyneux observed that 5% of all injuries at their hospital in Liverpool, England, were caused by glass and that most glass-related injuries occurred on the street (Armstrong & Molyneux 1992). Both in England and the US, broken bottle glass has been reported to be the leading cause of lacerations, accounting for 15–27% of all lacerations seen in an urban emergency department (American College of Surgeons Committee on Control of Surgical Infections 1984). For example, of the 241 children in the Ludlow community of Philadelphia (USA), 83 (34%) had been cut at least once while walking outdoors. Of the 83, 62 were not wearing footwear at the time of injury. The majority of lacerations (86%) were caused by broken glass (Martin & Makary, 1998). The third type of impact is the cost associated with litter collection and the losses (direct and indirect) caused by the presence of litter in public places.

The composition of roadside litter can vary considerably from place to place. The single most common litter item is the cigarette butt (Vesilind 1976). Cigarette butts may seem small, but with several trillion butts littered globally every year, the volumes add up (New South Wales Environment Protection Authority 2004). One research report states that 18% of all litter dropped to the ground is washed into streams, rivers, lakes and the ocean by storm-water runoff, particularly lightweight litter items, such as cigarette butts. The fibres in a cigarette filter and the remaining tobacco contain several residual alkaloids, including nicotine, which pose a health problem for wildlife when ingested (Tobacco.org 2005). Moreover, cigarettes being thrown from vehicles or pedestrians may be a fire hazard.

Public perception towards litter can vary widely. For example, in one study (New South Wales Environment Protection Authority 2004), people classified litter as offensive, such as cigarette butts and condoms; dangerous, such as syringes, broken bottles and glass; lasting a long time, such as plastic bags/bottles, chip packets and fast-food rubbish; unhygienic such as animal droppings and food waste; and somewhat acceptable, such as dried chewing gum on the pavement when almost invisible. The areas in which people drop litter can vary widely too. They include beach/coastal sites, other waterways, national parks, urban areas, roadways, major visitor spots and major sporting venues. Site factors are also powerful determinants of behaviour – the more litter that is present, the more people are inclined to drop litter. The environmental setting has an impact on people's behaviour. For example, discarding litter at places such as cinema complexes, football grounds and theatres may be seen as acceptable sites because someone is paid to clean up (New South Wales Environment Protection

Authority 2003, 2004, 2005a, b, Environment Protection Authority (EPA) 2003)

An array of socio-economical factors can affect public attitude towards littering, frequency of littering, and the effective approaches to hinder the littering tendency within an individual (Willoughby *et al.* 1997, Santos *et al.* 2005; Liu & Sibley 2004, Storrier & McGlashan 2006). These factors are both region- and culture-dependent and it is very important to study them if an effective littering-prevention programme is to be designed on a national level. Almost all Middle Eastern countries, like many developing countries in the world today, suffer from a widespread littering problem. Hence, this work will be of significance to decision-makers who are attempting to tackle this problem in these countries.

## Methodology

This study was carried out in Nablus district, located in the northern part of the West Bank-Palestinian Territories. The population of Nablus district is projected at 363 630 in 2006 (Palestinian Central Bureau of Statistics (PCBS) 1999). The study was carried out during June and July of 2005. The study population consisted of people residing in the district. The target group included all adult residents and children at least 12 years of age and was selected randomly. The sample size was 1000 people from a wide spectrum of social and economic status (SES). A multi-stage sampling procedure was utilized in the selection of the study subjects (Fowler 1984). The estates were stratified according to the SES (low, lower-middle, upper middle and high SES). The stratification criteria were based on general status of housing and type of residence. From each stratum, a predetermined number of subjects were randomly selected for survey (Scheaffer *et al.* 1990).

The main tool used in the data collection was a structured questionnaire specifically designed for this study. The questionnaire covered the socio-economic characteristics of the respondent as well as variables related to the respondent's littering attitudes and practices. The questionnaire included three independent variables: level of education; age; and type of residence (village, refugee camp, city centre, or city suburb). The latter variable has a socio-economic dimension. In general, refugee camps residents are the poorest and most disadvantaged in Nablus district, whereas the residents of city suburbs are the richest and most privileged. Six dependent groups of variables were included in the survey: (1) street littering frequency; (2) types of litter items usually thrown; (3) the main driving cause to litter; (4) most effective technique in preventing the interviewee from throwing litter in the streets; (5) willingness to volunteer in a public street cleaning campaign; and (6) the interviewee opinion on responsibility for street cleanliness. After the questionnaire was pre-tested,

Table 1: Surveyed sample distribution (numbers and percentages) based on education, age, and type of residence

Independent group	Number of respondents (percentage in parentheses)					Total
Level of education	Illiterate	Elementary school	High school	College or university degree	Post-graduate education	
	70 (7%)	208 (21%)	247 (25%)	443 (44%)	32 (3%)	1000 (100%)
Age	12–14 years	15–20 years	21–30 years	31–50 years	> 50 years	
	86 (8.5%)	295 (30%)	364 (36%)	169 (17%)	86 (8.5%)	1000 (100%)
Type of residence	Refugee camp		City centre	City suburb	Village	
	124 (12%)		204 (20%)	135 (14%)	537 (54%)	1000 (100%)

it was administered to the respondents in the local language, which is Arabic. The interview was conducted from door-to-door and the questions were targeted to either the head of the household, the spouse, any other adult, or a child provided he/she was 12 years or older.

Analysis of data was performed by the use of Statistical Package for Social Sciences (SPSS) computer program version 11.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics such as means and ranges were computed. An appropriate statistical test of significance [analysis of variance (ANOVA) test] was performed to determine the relationships between socio-economic variables and the respondents' littering attitudes and practices.

## Results

### Sample distribution and overall responses

Table 1 shows the surveyed sample distribution based on education, age, and type of residence. The highest percentage of respondents (44%) in terms of level of education were those who have a college or university degree, whereas the highest percentage (38%) of respondents was in the age group between 21 and 30 years old and the lowest percentage was of those who were between 12 and 14 years old. In terms of the type of residence, the highest percentage (54%) consisted of those living in the villages, and the lowest percentage (12%) was of those living in refugee camps.

Table 2 shows the overall citizens' response to survey questions. As can be seen from this table, the highest percentage of answers regarding throwing litter in the streets was 'never' (30%) or 'only when there is no nearby litter can' (17%), whereas 26% of the respondents admitted littering either 'sometimes' or 'mostly'. When questioned about the type of litter items which people throw, it was found that glass bottles, cigarettes butts, and food waste were the most common, making 91% of the common litter items. Insufficient availability of garbage bins (or litter cans) was claimed to be the main driving cause of littering by 56% of the respondents who admitted littering. In second place came the dirtiness of street, which 20% of the respondents blamed as their main

driving cause to litter. When asked about the most effective technique in preventing the respondent from throwing litter in the streets, 27% said that moral and religious convictions were the most effective. A similar percentage believed that an increased availability of litter cans was most effective. On the other hand, only 5% believed public anti-litter awareness campaigns to be the most effective method. When asked about their willingness to volunteer in a public street cleaning campaign, 48% of the interviewees responded positively and 26% responded negatively. Finally, 74% of respondents said that they believe that street cleanness is a shared responsibility of both the citizens and the municipality.

In the following sections, the impact of the three socio-economic factors studied (income, education level, and type of residence) on the littering behaviour of the interviewees are discussed. For each factor, the statistical ANOVA test was used to determine which of the responses shown in Table 2 (i.e., the dependent groups) were correlated to the socio-economic factor of concern.

### Effect of the level of education on littering

In order to see the effect of the level of education on littering, an ANOVA test was performed. This test revealed that only four out of six dependent groups shown in Table 2 had significant relationship (i.e.,  $P < 0.05$ ) with the level of education, as shown in Table 3. The highest percentage of responses by illiterate interviewees regarding throwing litter in the streets was 'never', the same was noticed for those with elementary and secondary education, whereas for those who have completed university or graduate studies, the highest percentage answer was 'for absolute necessity'.

There was also an effect of the level of education on the type of littering items that the people throw. It was found that 'food waste' was the highest category among illiterate interviewees, 'glass bottles' was the highest among elementary-, secondary- and university-educated interviewees, and 'cigarette butts' was the most common litter item among people with post-graduate education.

Participating as a volunteer in a public campaign for cleaning the streets was a highly acceptable idea for people with

Table 2: Overall citizens' response to the survey questions.

Question no.	Question (dependent groups)	Answer	Percentage of respondents (%)
1	Do you throw litter in the streets?	Never	30
		For absolute necessity	17
		Only when there is no nearby litter can	27
		Sometimes	7
		Mostly	19
2	If you throw litter, which of the following types of litter items do you usually throw?	Cigarette butts	30
		Glass bottles	34
		Food waste	27
		Bulky items	9
3	If you litter, which of the following is the main driving cause for you to litter?	Insufficient availability of litter cans	56
		Habit	8
		Laziness	6
		Dirtiness of the street (i.e., feeling that abstaining from littering will not help much)	20
		Lack of law enforcement	8
		For fun	2
4	If you litter, which of the following you feel will be most effective in preventing you from throwing litter in the streets?	Fines	12
		Negative image	10
		Moral and religious convictions	27
		Better street cleanness	15
		Public awareness campaigns	5
		Increased availability of litter cans	27
		Nothing will stop me from littering	4
5	Would you be willing to volunteer in a public street cleaning campaign?	Yes	48
		No	26
		Not sure	26
6	In your opinion, street cleanness is the responsibility of whom?	The citizens only	9
		The municipality only	17
		Both the citizen and the municipality	74

different levels of education with the exception of illiterate respondents. Finally, there was a general agreement among most interviewees, with various levels of education, that the responsibility for street cleanness is a shared responsibility of both the citizens and the municipality.

#### Effect of type of residence on littering

The ANOVA test revealed that four out of the six dependent groups shown in Table 2 had a significant relationship ( $P < 0.05$ ) with the type of residence, as shown in Table 4. Table 4 shows that the highest two percentages of refugee-camp residents mentioned that they throw litter in the streets only 'for absolute necessity' (31%) and 'only when there is no nearby litter can' (29%). For the other residents in city centre, suburb, and villages it was found that the two answers with highest percentages regarding throwing litter were either 'never' or 'for absolute necessity'.

There was a general agreement among respondents, from all types of residence, that the main two leading reasons for

street littering were the 'insufficient availability of litter cans' and the 'dirtiness of the streets'.

According to interviewees in city suburbs and villages, the two most effective factors that help in preventing street littering are 'increasing moral and religious convictions' followed by 'the increased availability of litter cans'. For residents of refugee camps and city centres the same two factors were also placed as the most effective but with the level of importance reversed. It is worth noticing that whereas about 20% of the residents of city centre and city suburbs thought that imposing fines would be the most effective method to prevent street littering only half that number (about 10%) shared the same opinion in the villages and refugee camps.

#### Effect of the age of respondent on littering

Table 5 shows a summary of the significant ANOVA test results correlating the age of respondents to littering habits. In the age groups 15–20, 31–50 and over 50 years, the most common response to the question 'do you throw litter in the

Table 3: Variation in citizens' response based on the level of education.

Question	Answer	Percentage of respondents (%)				
		Illiterate	Elementary school	High school	College degree	Post-graduate education
Do you throw litter in the streets?	Never	50	25	36	26	28
	For absolute necessity	16	25	25	30	38
	Only when there is no nearby litter can	11	22	17	21	16
	Sometimes	10	5	7	7	3
	Mostly	13	23	15	16	15
If you throw litter, which of the following types of litter items do you usually throw?	Cigarette butts	24	18	33	33	67
	Glass bottles	24	37	31	35	29
	Food waste	29	35	23	28	0
	Bulky items	23	10	13	4	4
Would you be willing to volunteer in a public street cleaning campaign?	Yes	40	59	51	42	50
	No	43	21	29	24	31
	Not sure	17	20	20	34	19
In your opinion, street cleanness is the responsibility of whom?	The citizens only	7	8	11	9	3
	The municipality only	23	31	12	12	19
	Both the citizen and the municipality	70	61	77	79	78

Table 4: Variation in citizens' response based on type of residence.

Question	Answer	Percentage of respondents (%)			
		Refugee camp	City centre	City suburb	Village
Do you throw litter in the streets?	Never	18	31	33	32
	For absolute necessity	31	32	30	24
	Only when there is no nearby litter can	29	19	16	18
	Sometimes	8	7	10	6
	Mostly	14	11	11	20
If you litter, which of the following is the main driving cause for you to litter?	Insufficient availability of litter cans	50	53	48	61
	Habit	7	7	11	8
	Laziness	4	7	5	6
	Dirtiness of the street (i.e., feeling that abstaining from littering will not help much)	25	19	26	18
	Lack of law enforcement	11	11	8	6
	For fun	3	3	2	1
If you litter, which of the following you feel will be most effective in preventing you from throwing litter in the streets?	Fines	12	20	19	8
	Negative image	5	5	8	13
	Moral and religious convictions	23	24	29	29
	Better street cleanness	16	13	14	16
	Public awareness campaigns	4	9	6	3
	Increased availability of litter cans	36	25	19	27
	Nothing will stop me from littering	4	4	5	4

streets?' was 'never', whereas in the age group 21–30 years the most common answer to the same question was 'for absolute necessity'. It was interesting to see that age had another impact as only 11% of the older respondents (older than 50 years) admitted to 'mostly' throw litter in the street, in com-

parison with 28% of the youngest respondents (12–14 years) who admitted the same.

The respondents' age also seemed to have an impact on the type of litter items thrown, as seen in Table 5. It was found that the highest percentage of litter thrown by the age

Table 5: Variation in citizens' response based on age of respondent.

Question	Answer	Percentage of respondents (%)				
		12–14 years	15–20 years	21–30 years	31–50 years	> 50 years
Do you throw litter in the streets?	Never	15	29	26	36	54
	For absolute necessity	17	28	32	26	17
	Only when there is no nearby litter can	29	20	18	22	12
	Sometimes	11	7	7	4	6
	Mostly	28	16	17	12	11
If you throw litter, which of the following types of litter items do you usually throw?	Cigarette butts	10	20	34	48	38
	Glass bottles	43	41	34	20	19
	Food waste	37	35	23	19	24
	Bulky items	10	4	9	13	19
Would you be willing to volunteer in a public street cleaning campaign?	Yes	59	43	43	59	56
	No	19	28	26	21	37
	Not sure	22	29	31	20	7
In your opinion, street cleanness is the responsibility of whom?	The citizens only	7	7	10	8	12
	The municipality only	38	15	14	12	24
	Both the citizen and the municipality	55	78	76	80	64

groups 12–14 years and 14–20 years was glass bottles. For the age group 21–30 years, two types of litter were equally the most common, namely cigarette butts and glass bottles. For the older respondent groups, 31–50 and over 50 years, the most common litter item thrown was cigarette butts. 'Food waste' was identified by all age groups as the second or third common litter item thrown, whereas bulky items (e.g., boxes) were identified by all age groups as the least common litter item they throw.

It is worth mentioning here that the majority of all age groups responded positively to the question 'Would you be willing to volunteer in a public street cleaning campaign?', although the agreement percentage was lower among the respondents between 15 and 30 years old in comparison with the younger and older respondent groups. Overall, between 45 and 60% of the people surveyed claimed to be willing to participate in such campaign.

Finally, there was a common agreement among all age groups that street cleanness is a shared responsibility of the citizens and the local authorities. It was interesting to see, however, that the youngest (12–14 years) and oldest (older than 50 years) groups contained the highest percentage of respondents who believe that street cleanness is the responsibility of the local municipalities alone.

## Discussion of results

Litter minimization should be considered an environmental priority in the Palestinian Territory as 70% of the respondents surveyed in this study mentioned that they do litter with

various frequencies. Litter reduces the aesthetic appeal of public places including streets, parks, and waterways, as can be seen at the shore of the Mediterranean Sea in Gaza Strip. Litter can cause blockages of the storm-water drainage systems leading to street flooding, as can be clearly observed in many Palestinian cities during the winter season. It can also be dangerous to people, particularly when it involves items such as broken glass and other sharp items. Litter is also considered a fire hazard as cigarette butts are a very common litter item in the Palestinian Territory and in the Middle East in general. This fact was emphasized by the respondents to this study, as 30% of those who drop litter, throw cigarette butts. Litter costs the local communities huge sums of money to clean up every year.

Streets serve as a playground for many children in Nablus district, which is also the situation in all other Palestinian districts and most cities of the Middle East. This study has identified the extensive amount of broken glass on the streets of Nablus district localities, as glass bottles constituted the highest percentage (34%) of litter items thrown. This percentage was high among citizens of all education levels, but was the highest among citizens with elementary education. From daily observations, many children in Nablus district, as well as in other Palestinian districts, had been injured by broken glass litter at some point in their lives.

The results of this study reveal several attitude trends towards littering. The highest percentage of interviewees with the lowest education level (illiterate or with elementary education) mentioned that they never throw litter, while the highest percentage of interviewees with a higher education levels

admitted that they litter but only 'for absolute necessity'. This observation may initially seem counter-logical, since one expects that education, not illiteracy, should contribute to litter reduction. However, it is possible to explain this observation based on the 'subconscious psychological self-defence' theory (Abu-Zant M., Head of Department of Social Sciences, An-Najah University, Nablus-Palestinian Territory: personal communication, 2006). When confronted with such question as 'Do you throw litter in the street?' an illiterate interviewee may consider that question as an 'accusation' or an 'impression' formed by the questioner. The interviewee may further believe that this 'impression' is strengthened by his social status as an illiterate. Being inconvenienced with the question, the interviewee is likely to take a subconscious psychological self-defence position and answer with 'never'.

In addition to littering frequency, the study revealed that different types of litter are thrown by people with different levels of education. The most common types included food waste, glass bottles, and cigarette butts. The social customs in the Palestinian community, which are similar to those in most Middle Eastern communities, play a key role in this regard. For example, consuming food in the street carries a negative image in the Middle East and is unacceptable, especially for older individuals or individuals with high social or educational status, whereas smoking does not carry the same negative image. This explains why none of the interviewees with post-graduate education has identified food waste as a litter item which they throw, whereas cigarette butts was the most common litter item for this education level group. The same explanation can clarify why food waste and glass bottles were common among the younger and the illiterate interviewees.

On the positive side, there was a positive attitude among interviewees towards participating as volunteers in public campaigns for street cleaning. The rejection rate for participation in such campaign was highest among illiterate respondents, namely 43%. This shows that education contributes to a better acceptance of the concept of volunteering in such actions for the common good, and emphasizes the importance of education among Palestinians in general, and public awareness towards keeping all localities as clean as possible in particular. Moreover, street cleanliness was agreed by the majority of the interviewees, with various levels of education, to be a joint responsibility of both the citizens and the local municipalities. This agreement can be considered as the basis toward keeping localities as clean as possible when control measures are implemented.

Respondents also varied in their littering attitudes according to their type of residence. The highest percentage of respondents who indicated that they litter 'mostly' was among village residents (20%) followed by refugee-camps residents

(14%). This finds its roots in the local customs in the villages and refugee camps where littering carries less of a negative image than in the cities, and in addition the fact that litter control measures (e.g., availability of litter bins) are less common in villages and refugee camps contributes to this trend. Similarly, there was a common agreement among the respondents about the main driving cause for littering. Most respondents indicated the 'insufficient availability of litter cans' and 'dirtiness of the street' as the two main causes. The former reason was chosen by a higher percentage (61%) among village residents.

There are many factors that can contribute to reducing the littering behaviour among people. The majority of interviewees in this study have indicated that the main two factors that will help in hindering them from littering were enhanced 'moral and religious convictions' and 'increasing the availability of litter cans'. Given the fact that Islam is the religion of the majority of the residents in the area and that Islam, like other religions, places strong emphasis on cleanliness to the extent that considers the removal of dirt from streets as an 'act of worship', the role of religious authorities in this regard becomes very important. It will be vital, for example, for clerics to frequently encourage people to follow the regulations of Islam that discourage or forbid littering, which will help in reducing the littering phenomenon. Interestingly enough, the results in Table 4 show that there are more people who will abstain from littering due to improved moral or religious convictions (an average of 26%), compared to the number of those who will abstain as a result of a typical anti-litter public awareness campaign (an average of 5.5%) via TV or other media outlets. This indicates a special pattern of thinking that is unique to the Middle East in comparison with western countries. Local authorities (municipalities and village councils), on the other hand, should increase the number of litter cans in the streets and other public places as an effective measure to discourage people from littering. It is interesting to see that an average of only 15% of the respondents think that fines are an effective method for litter prevention. This is probably due to the weak law enforcement in the Palestinian Territories under the current political conditions, and may not be necessarily true in other parts of the region. In fact, fines proved to be an effective technique in litter prevention in Israel, for example.

Finally, education, at all levels, should be a way of bringing about public awareness against littering in the Middle East. An environmentally aware population along with a determined leadership in the local councils would ensure that the litter that will continue to be generated in the future can be properly reduced. One of the first and foremost steps in creating a group of citizens with life-long commitment to

environmental protection is anti-littering education that should be available to children at a very young age (Hasan *et. al.* 2004).

## Conclusions and recommendations

Litter prevention is an important environmental and health protection act that should be taken into consideration in future legislation and strategic planning at different decision-making levels within the Palestinian Territories and the Middle East in general. In this study, a public interview survey approach covering a sample of 1000 residents in Nablus district (Palestinian Territories) was followed to identify citizens' attitudes related to the littering phenomenon and to identify potential impacts of three socio-economic factors (age, education level, and type of residence) on the littering behaviour of residents. It is important to emphasize here that while the interview survey approach is in general a good tool in studying social behaviour, it has its limitations. Therefore, local government bodies cannot rely solely on survey outcomes such as that presented in this study, to build full-scale litter-prevention programmes. Nevertheless, important observations

can be drawn from such surveys, which can be used as one tool in designing litter prevention strategies.

The survey in this study revealed that 70% of the citizens interviewed admitted practising littering at variable frequencies. However, the types of litter items thrown by these individuals were found to vary according to age and level of education. Other aspects that were found to be influenced by the three socio-economical factors studied include the interviewee's main cause for littering, opinion on effective methods to hinder littering, opinion on responsibility for street cleanness and willingness to participate in voluntary work related to litter control.

For a future action plan, the authors believe that an array of information will be needed before implementing an effective litter control programme. Survey data such as the one presented in this study is one piece of required information. Other forms of useful information include the knowledge of the impact of other key socio-economic factors affecting littering behaviour, such as the individual's income level, gender, and moral and religious convictions, to mention some examples. A cost-benefit analysis will also be needed to assess the feasibility of a litter prevention/reduction programme.

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