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Sustainable Municipal Waste Management Improvement in Tehran City through Community Participation

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Abstract

The paper examined level of community participation and the relationship between socio-economic background (sex, age and income level) and socio-cultural (the level of awareness, and education level) and community waste practices in Region One municipality of Tehran.

This research is based on the theory of different forms of community participation in MSWM, which states that community participation can be categorized at three levels: Individuals' participation, community groups' participation, and membership or organizer of community groups. 500 residents were randomly surveyed from the Region One municipality of the Tehran city using structured questionnaire. Data collected were subjected to percentage, mean, standard deviation, t-test and Pearson statistical analyses.

Findings revealed that Region One had fair level of community participation in the individual waste practice and low level of community participation in collective actions in waste practice. While socio-economics (gender, income) had significant influence on individual actions, male in lower income households were more active in individual waste practice, in collective actions factors had not any significant relation with community participation. Socio-cultural (level of education and level of awareness) factors had not any significant relation with community participation in both individual and collective action forms. The study recommends that more efforts should be taken by community to be involved in MSW activities that will significantly impact the local economy, social, and environment, and as a result will empower and support the cohesion of the community.

Keywords: Municipal solid waste management; Community participation

Introduction

Waste management isn't as technically complex as energy or housing, but it does have its own set of issues and solutions, and these deserve attention. A good assessment provides a sound basis for local authorities to develop a vision for future improvements of waste management based on such a comprehensive view of local circumstances and resources.

There have been numerous case studies in developing countries that have proven that community participation in waste management play a vital role in contributing to the success of the services provided [1].

Community participation in the preparation of a program can assure the reflection of community priorities and needs. This is because communities themselves know best what their needs and problems are. Therefore, Subash [2] argues that program design should assure to reflect and integrate demand and priorities of the community that it serves.

There is no single definition for community participation. Many researchers interpret community participation based on their own views. Waste defines community and community participation as – "A community consists of people living together in some form of social organization and cohesion. Its member share in varying degrees of political, economic, social and cultural characteristic as well as interest. Community Participation - is the process by which individuals and families assume responsibility for their own health and welfare and for those of community and develop the capacity to contribute to theirs and the community development.

Subash [2] sees community participation as a means to enhance efficiency, effectiveness, and sustainability of projects. He argues that

involving the community in projects can improve cost sharing; can lead to more effective implementation because tasks and responsibilities are shared; and can also raise local ownership. While, the WHO perceives community participation as the involvement of residents in programs to resolve issues. Community participation is important, particularly in the provision of basic service programs. On the other hand, Fatin et al. [1], describe community participation as "an interactive process that involves communication, listening, consulting, merging and collaborations with citizens and citizens groups". This interactive process opens opportunities for citizens to give their opinion on decision making processes. The third manner of defining community participation is more suited to discuss community participation for its emphasis on autonomous and interactive approach. In this approach, public decide for their needs instead of depend on other decisions.

Overall aim of the study was to assess level of community participation in Region One Municipality of Tehran. The overall proportion of people engaging in waste activities considered as the level of participation in both individual and collective action forms. Additionally, study examined if there were significant differences between citizens who participate and those who do not participate

in terms of their socio-economic characteristics (gender, age, income level), and socio-cultural characteristics (level of education and level of awareness).

Theoretical Background and a Brief Literature Review

According to a community means to a group living in a certain geographical or administrative area, e.g. a neighbourhood, who has access to and uses the same service. This is not to say that the community is considered to be homogeneous, but it is realised that conflicting interests and priorities may exist between different groups or individuals within the community and that these must be recognised and utilised (Figure 1).

Subash [2] defined community participation as the sociological practice by which residents organise themselves and become involved at local level or a neighbourhood, to advance the situations of their life (water, sanitation, health, education, etc.). It encompasses different degrees of individual or collective forms of participation (financial and/or physical contributions, social and/or political commitment) at different stages of a project.

To keep a SWM system running, individual as the members of a community have different roles, there are also various forms and functions in which they can participate in SWM. So, theoretical background of this study shaped based on the different forms of community participation.

In this study, level of community participation in waste practice considered as the percent (rate) of households involved in waste practice compared to the total number that could be participating. Overall percentage mean of community participation in each level calculated by the total percentage of all item divided by the number of applicable items.

The level of participation in SWM practice are assessed on the basis of eight principal questions focusing on the following critical areas as follow: Regarding individual waste practice, five indicators selected, providing recycle bin, dispose at 9 o'clock, practice reduce, separate at source and practice reuse. The other issue is community participation in collective action form which is assessed with three indicators, membership in NGOs, participate in campaign activities and organizer or a committee member of campaign activities. For answering to second research question, relationship of level of community participation in MSW analysed by socio-economic factors: gender, age and income and socio-cultural factors: level of awareness and level of education. It may generally be expected that some relationship exist between levels of participation and different factors. Regarding the level of participation, the emphasis is given to the individual waste practice and collective waste actions.

Awareness level considered as the awareness about the waste management system (legal and institutional) consist of three questions: understanding about waste management system in Regional Municipality, waste laws/regulations and payment for waste services are being studied.

Materials and Methods

Study area

The study involves communities surrounding Region One of Tehran municipality. Region One Municipality consists of 10 sub-regions and 27 neighbourhoods. Figure 2 shows location of the study Area, Region One Municipality of Tehran (2011). According to the population census in 2006, the target population of the study area consisted of approx. 443 thousand people.

Questionnaire administration

The total of 486 household respondents selected with a 95% confidence level with a confidence interval of 5% are taken in neighbourhoods of case study area. The sampling model is multi-stage stratified sampling. Initially, the region one will divide by ten strata units that are the geographic administrative district (sub region). proportionate allocation uses a sampling fraction in each of the strata that is proportional to that of the total neighbourhood.

The questionnaire is structured in three sections:

- Section A refers to 4 questions on socio demographic characteristics which include gender, age, educational level, and monthly income.

- Section B refers to 8 questions concerning level of community participation in individually and collective action forms in MSW practice in Region One Municipality.
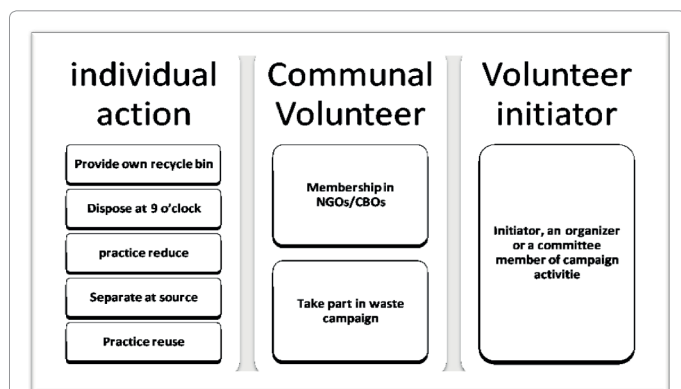

Figure 1: Evaluation frameworks of level of community participation in MSW Practice (Anschütz 1996; Moningka & Laroui 2000; Subash 2006; Bulle 1999; Sharp and Colony 2002).
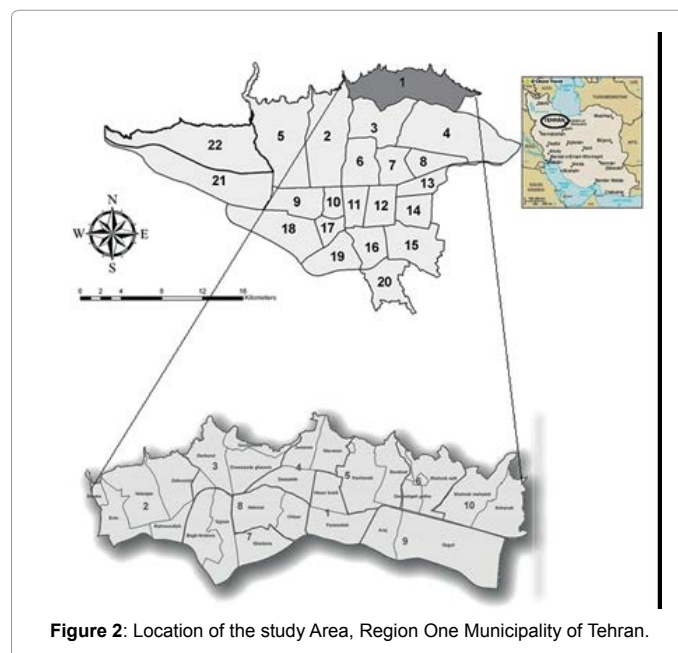

Figure 2: Location of the study Area, Region One Municipality of Tehran.

- Section C refers to 3 questions concerning households' awareness level about the waste management system.

This study employed a survey research methodology where a structured, simple, questionnaire was designed, pre-tested, and modified to collect data through Yes, No questions which required respondents to choose one answer that appropriately describes their idea.

Methods of validity and reliability testing of questionnaires used in this research are as follow: content validity by supervisory committee, they commented on major problems related to structure, wording, and response categories. Second validity type of the questionnaire was made by assistance of three experts from Region One Municipality of Tehran. The third methods for validity and reliability test of research questionnaire performed through a pilot test by 50 households in the case study area [3].

Data analysis

The questionnaire data were organized and analysed by using SPSS statistics software to assess the percentages of respondents to investigate the different level of community participation in MSWM in the case study area.

In order to make cross tabulation, relationships between household socioeconomic factors and the level of community participation, independent t-test, and person correlation used.

Results and Discussion

Socio-economic characteristics of the survey respondents

The study involved 468 respondents. Table 1 demonstrate the Socio-demographic characteristics of survey respondents includes of gender, income, and age.

The first question in the questionnaire gives a picture of the gender profile of the residents of the study area. Among the respondents females were 332 (70%) and male were 136, which is 30% of all respondents.

The age distribution of respondents revealed, the majority of respondents were between 30 to 50 years old.

Another variable is the level of income which is categorized into two groups. From the results, 57% of respondents earned Less than 1000000 Rials and 43% of them earned more than 10 million Rials per month and above; Results represent the majority of respondent are among middle and high income groups.

Community participation

Individual action: Level of community participation (average participation rate) is equal to 33% with a maximum of 49% for disposing waste at 9 o'clock and a minimum of 20% for practice reuse based on the results presented in Table 2.

In addition, overall participation results, created by averaging the assessment results of five indicator, were constructed as dependent variables. Of the five individual activities indicated in the questionnaire; two activities of respondents showed low participation, while three other activity gained participation of citizen in fairly much ranking. There are no empirical studies based on the variables and indicators of community participation in MSW practice which is considered in this study, except recycling rate. From above argument, in overall, the individual participation in waste practice assume fair or moderate level of involvement in comparison to the other developing and developed countries activities.

Variable	Frequency	Percent
Gender		
Female	332	70%
Male	136	30%
Income (amount in Iranian Rials)		
Less than 1000000 Rials	260	57%
More than 1000000 Rials	208	43%
Age		
Less than 40	224	50%
Above 40	244	50%

Table 1: Socio-demographic Characteristics of Survey Respondents.

	Waste practice	Frequency	Percent	Average/mean
Individual Action				33%
	Provide own recycle bin	112	24%	
	Dispose waste at 9 o'clock	229	49%	
	Practice 'reduce'	120	26%	
	Practice 'reuse'	94	20%	
	Separate types of wastes at source	136	29%	
Communal volunteer				12%
	Membership in NGOs	66	14%	
	Participate in Campaign Activities	44	9%	
Community organizers				1%

Table 2: Level of community participation in MSW practice.

Communal volunteer: Level of community participation (average participation rate) is equal to 12%, which indicate a low level of participation, a minimum of 9% of respondents participate in campaign activities and projects regarding waste issues and a maximum 14% of them are members of NGOs. It should be noticed that there are not many volunteer opportunities for citizens. For example, there are a few campaigns for waste minimization, reuse and recycling. This issue seriously affects the level of participation in collective actions. Participating in campaigns and volunteerism activities in waste management needs to create by social, cultural and legal contexts.

It was not neglected that there are not so many volunteer opportunities in case study area, so there are limited campaigns of waste minimization, reuse and recycling, this issue seriously will affect level of participation in collective action.

In addition, as shown in Table 2 this is quite obvious that the majority of respondents participated in individual rather collective activities such as membership in NGOs or take part in campaign activities. This indicate the potential of citizens to participate more in collective actions.

Community organizers: For the highest level of community participation, one question asked respondents about their participation as a community organizer, just 1% indicate such an action which is quite low. So in this study, this level of participation didn't analyse and associate with social variables.

The participation of the community in the case study area was found to be highest in individually waste practice in terms of contribution. Their participation was low in collective action forms. Participating in campaign or other cooperation with other waste actors need cultural

grounds and policy oriented. Individuals are seen not to be very responsive to collective actions.

Community waste practice in terms of socio-economic factors

Statistical difference between community waste practices in terms of socio-economic factors was determined by conducting an Independent t-test.

Table 3 contains the results of the t-test for independent samples. Based on the findings males respondents (M=8.76, SD=1.25), shows a higher level of individual waste practice in comparing to females, (M=8.38, SD=1.29). The result shows a significant value of P<0.05 that is {t (390)=-3.26, P=0.001}. This shows that there is a significant difference in male respondent participation in individual waste practice.

Moreover, the people who have income less than 1000000 Rials (M=8.65, SD=1.14) displays a higher level of individual waste practice compared to people with income more than 1000000 Rials, (M=8.36, SD=1.37). In addition, the results of the t-test for dependent samples indicate that there is a significant difference, {t (401)=2.52, P=0.012}.

Respondents with age above 40 (M=8.54, SD=1.27) reveals a higher level of individual waste practice in comparison to people with age less than 40, (M=8.50, SD=1.24). In addition, the results of the t-test for dependent samples indicate that there is no significant difference, {t (466)=0.35, P=0.72} among respondents.

Regarding collective actions, females (M=5.76, SD=0.47) shows a higher level of waste collective action in comparison to males, (M=5.74, SD=0.49). In addition, the results of the t-test for dependent samples indicate that there is no significant difference, {t (466)=0.40, P=0.689} between female and male respondent in collective actions waste practice.

Moreover, the people who have income more than 300 USD and less than 300 USD show same level of collective action equal to (M=5.75). Further, based on this table, people with age above 30 and age below 30 years old reveal the same level of collective action equal to (M=5.75). We applied independent sample t-test to examine whether these differences are statistically significant or not. As can be seen from Table 4, there is no significant relationship among gender, income, age and collective action (p>0.05).

As can be seen from Table 3, there are significant relationship among gender, income and community participation (p<0.05). Therefore, according to the results, male respondents with less than 300 USD show a higher level of individual waste practice. The study results found gender to be significant predictors of household waste behaviours in contrast to study findings, age exhibited a positive relationship with household waste behaviours, this research results indicate that age

Variable	Individual practice					
	N	**M**	**SD**	**t**	**df**	**P**
Gender						
Female	332	8.38	1.29	-3.16	466	.002
Male	136	8.76	1.15	-3.26	390.62	.001
Income						
Less than 1000000	260	8.65	1.14	2.57	466	.010
More than 1000000	208	8.36	1.37	2.52	401.78	.012
Age						
Less than 30	224	8.50	1.24	-.35	466	.72
Above 30	244	8.54	1.27	-.35	464.03	.72

Table 3: Comparing individual waste practice in terms of socio-economic factors.

Variable	Collective action practice					
	N	**M**	**SD**	**t**	**df**	**P**
Gender						
Female	332	5.76	.47	.40	466	.689
Male	136	5.74	.49	.40	340.10	.693
Income						
Less than 1000000	260	5.75	.49	2.57	466	.010
More than 1000000	208	5.75	.45	2.52	401.78	.012
Age						
Less than 40	224	5.75	.47	.01	466	.993
Above 40				.01	463.48	.993

Table 4: Comparing collective waste practice in terms of socio-economic factors.

group have not significant association with community participation.

This result is in contrast to other research by several studies. Regarding gender, no firm conclusion can be drawn about the effect of gender in community participation. While female are less active in individual waste action, they are not more active than male in collective waste actions. It seems more analysis and explanation needs to be done in this area.

For analytical convenience, the author clustered the different education levels into two broad groups, Group 1: Up to 12th grade education (%). Group 2: Attending College or higher. These data represented in Table 1. Out of the 468 (40%) of respondents educated up to 12th grade education and total number of 60% had attended college or university degree (from high diploma to PhD and higher, this is shown majority of respondent are well educated.

Independent sample t-test carried out to examine differences between people with education up to 12th grade education and people attending college or higher regarding community waste practice in both individual and collective action forms. As can be seen from Table 5, sample t-test shows there is no significant relationship between education level and individual waste practice (P>0.05 that is {t (466)=-0.30, P=0.763}).

Regarding collective practice in term of education level, as can be seen from Table 5, result demonstrates there is no significant relationship between education level and participation in waste collective action (P > 0.05 that is {t (462)=0.20, P=0.845}).

Level of awareness

Based on the results of the survey, only (10%) of respondents were aware about waste management system in the municipality and almost 90% were not aware about such a system in the regional municipality. Regarding public awareness about laws and regulations of solid waste management, only 24% of respondents indicated they were aware about waste laws and regulations. Almost two thirds of respondents did not have awareness about this issue. Although the waste collection fees payments were compulsory and received by the annual home bill from all residents, further to knowing about awareness of respondents about payment for waste services, they were asked whether they paid the fees, Their responses, which are represented in Table 6, revealed that 50% of the respondents were aware about their payment, while 37% were unaware and expressed that they did not pay any fees for waste collection. the respondents who answer "Yes" to more than 1 question out of 3, accounted aware people.

Community waste practice in term of awareness level

To examine the relationship between awareness and community participation, Pearson correlation coefficient was used. The average

Education level	N	M	SD	t	df	P
Up to 12th grade education	188	8.50	1.25	-.30	466	.763
Attending college or higher	280	8.54	1.26	-.30	402.58	.763

Table 5: Summary of mean comparisons t-test results for the level of individual waste practice in terms of education level.

Education level	N	M	SD	t	df	P
Up to 12th grade education	232	5.75	.47	.20	462	.845
Attending college or higher	232	5.76	.48	.20	461.96	.845

Table 6: Summary of mean comparisons for the level of community participation in waste collective action in terms of education level.

score on the statements of the community participation in individual and collective action forms calculated and correlated with total score of awareness. In current study, the respondents who answer "Yes" to more than 1 question out of 3, accounted aware people. Based on the results presented in Table 7, there is no significant statistical relationship between community participation and awareness (P>0.05).

While previous studies of association of socio-cultural factors with community participation in waste related activities found an influence on the community participation in MSW practices, this analysis does not observe such relationships. The study results indicate that people with higher educational qualification and awareness don't tends to participate more in MSW practice.

Conclusions

The findings revealed that community participation in MSWM in case study area is still not appropriately established in Region One Municipality of Tehran, fostering community participation in both individual and collective action forms are essential for effective MSWM. The level of community participate in MSWM was used to gauge their potential co-operation and commitment to MSW practice in individually and collective action forms. It was found that willingness to participate in the MSW practices is not reliably explained by socio – economic and socio – cultural variables. However, the community participation in individual waste practices showed a significant relationship with gender and income.

Issue of Awareness	frequency	percentage%
Waste Management System in Municipality	48	10%
Waste Laws/ Regulations	112	24%
Payment for Waste Services	234	50%

Table 7: Awareness of waste management system.

Recommendations

In view of the above conclusion, the following recommendations are hereby made: overall for the improvement of the community participation in current MSWM system in Region One Municipality of Tehran in particular and in Tehran City in general where there is a need for behavioural and attitudinal change in achieving community participation in MSWM system.

To increase the community participation in individual action forms, providing motivational or hindering factor for individuals activity such as provision of near-by solid waste collection points or establishment of solid waste recycling plants with segregation facilities to reduce the quantity of solid wastes generated.

To increase the community participation in collective action forms and brings significant change, strengthened awareness creation campaign will have a pivotal role. To implement this, coordinating and working together with different stakeholders like media, community based organizations, NGOs and other associations by building their capacity has vital role.

Since educating the community is one of the biggest problems which threaten their participation, educating the people about waste prevention, separation and recycling can help the community by saving them from its expected negative outcome and as the same time saves their resources that can be an additional income to the family.

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