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## INVOLVEMENT OF CITIZENSHIP IN HAZARDOUS WASTE MANAGEMENT AND IN USE OF RECYCLING CENTRES IN MADRID CITY (SPAIN)

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### Abstract

The present study analyses the hazardous waste management by citizens via Fixed Recycling (FRC) and Mobile Centres (MRC) with the aim of suggesting improvements of both services. In addition, the effectiveness of a campaign for environmental education developed by the Madrid council was assessed. A questionnaire was carried out on a sample of 5644 inhabitants of four different districts of Madrid City. Data were treated quantitatively using SPSS 17.0 and categorized using content analysis. It was found that the campaign effectively promoted the existence and use of Recycling Centres and was able to identify possible amendments to improve future campaigns.

*Keywords: recycling centers, hazardous waste, waste management of citizenship*

### INTRODUCTION

In the past hazardous waste were almost exclusively managed by the private sector. However, the increasing consumption of diverse types of domestic products in recent times has led to an urgent need for regulation in the management of this waste at a national and local level (Gómez, Rodríguez & Vela, 1995). However, the success of many waste initiatives ultimately depends on the preparedness of thousands of householders to cooperate (Bulkeley, Watson, Hudson and Weaver, 2005).

In Spain, waste management is regulated by legislation at three levels: (a) national – Law 10/1998 of Waste (21<sup>st</sup> April, 1998), (b) regional – Waste Strategy of the Community of Madrid (2006-2016) and the Law 5/2003 Waste of the Community of Madrid (20<sup>th</sup> March, 2003), and (c) municipal – By-law of public area cleaning and management of waste products of the Madrid Council (27<sup>th</sup> February, 2009).

In the development of legislation Madrid City has created FRC and MRC with the objective of providing all citizens a 'public access procedure' to manage hazardous waste adequately. Access points are municipal centres of medium transfer for selective collection of specific waste, which are located in a fixed physical point (FRC) or alternated at selected points (MRC). To educate citizens about the public access procedure an environmental communication program has been introduced. The program was developed by the Department of Education for Sustainable Development together with the Department of Exploitation and Waste Collection of Madrid Council and was assessed by the Environmental Education Group of the University Autónoma of Madrid.

The aim of this study was to analyse the use of Recycling Centres by citizens in hazardous waste management in order to give recommendations for the future improvement of waste management in Madrid City. The specific objectives of the study are: (i) to sample and analyse data about domestic waste separation at FRC and MRC, (ii) to study the public knowledge of the existing procedures of managing hazardous domestic waste, (iii) to assess the public perception about the functioning of these procedures, and (iv) to assess the efficacy of a local campaign in environmental communication to spread information about FRC and MRC.

### EXPERIMENTAL DESIGN

The methodology was based on a personal questionnaire used to collect data. The sample was taken from four districts of Madrid City (Figure 1): Hortaleza (n=1295), Latina (n=2032), San Blas (n=1374) and Moratalaz (n=944). A random stratified sampling technique was used to select the sample.

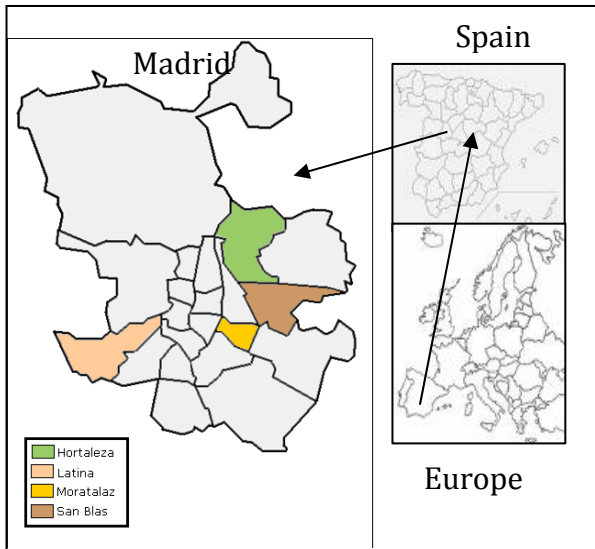


Figure 1. Districts of sample in Madrid City.

The treatment of the quantitative data was descriptive using statistical software SPSS 17.0. Qualitative data was included in the descriptive analysis by emerging categorization, which was determined following analysis of content.

## RESULTS AND DISCUSSION

Results of a chi-squared test showed that socio-demographic variables of district and age influenced citizen knowledge and activity in hazardous waste management. Four themes emerged in the data including: (1) separation of domestic waste (e.g., San Blas and Moratalaz districts and the age group from 18 to 30 years old separate less); (2) knowledge of hazardous products (e.g., Moratalaz and San Blas districts and the age group over sixty years old know less); (3) knowledge of management procedures (e.g., Moratalaz and the age group over seventy know less); and (4) doubts about waste separation procedures (e.g., citizens from La Latina and people from 30 to 60 years old).

When the citizens were questioned about the type of waste that they separate, 80% of the sample separated paper, glass, containers and residual, whereas other fractions were separated by 45-60% of the sample. Percentages appeared very high in all categories and districts, which may have been biased by participants responding in line with perceived societal 'norms' or for other unknown reasons. The following table shows the five most common motivations respondents cited to adopt separation of materials in the recycling process.

Reasons for....	
Separating	Not separating
1. Look after the Environment	1. House too small
2. Facilitate waste management	2. It is not convenient for me
3. Consciousness	3. I am not interested
4. Avoid pollution	4. I do not have time
5. Benefit everybody	5. I do not know

Table 1. Summary of motivations to separate or no separate domestic waste.

We must remark that the reasons given by the sample to separate domestic waste refer to attitudes that are linked to social and environmental concerns, i.e. moral motivations. However, the motives given for not separating are related to the immediate environment of the respondent that either facilitate or inhibit recycling, i.e. physical and structural motivations (Gamba y Oskamp; 1994 cited in Berenguer, 1998). In this way, management practices should focus on awakening the awareness of the social and environmental impacts of recycling on citizens to encourage separation of domestic waste and erase the self-limiting beliefs that impede this behaviour.

In terms of awareness, there were three major doubts among citizens. (1) How to manage specific waste (approximately 25% of the sample), including oils, containers, white goods, electrical devices, bulbs, aerosols, mobile phones and batteries. (2) What municipal management procedures already exist. For example, respondents could not distinguish between MRC and voluminous collecting tracks. (3) What management procedures follow collection of the waste. The latter point may be of particular significance because more than 95% did not respond to the part of the questionnaire dealing with the management procedure for bulk waste.

The analysed sample depicts a majority of citizens aged between 30-60 years, whose work timetable (for the employed population) is in the mornings on weekdays. This suggests that the FRC and MRC timetable should coincide with no working hours. Instead, a general lack of knowledge about FRC and MRC was perceived among citizens (56-75% of the sample). When respondents were informed about the access points, a clear intention

of using FRC in the future was uncertain, whereas respondents expressed their intention to recycle via MRC. Therefore, communication and education on recycling access points should be improved and intensified. The existence of a previous campaign seems to have influenced waste products separation, the knowledge about hazardous waste and about the existence of Recycling Centres. Communication and education are recommended to take place via campaigns designed to respect the physical and structural limitations encountered by citizens in the context of each district and age group.

The results showed a 'local' approach of the awareness and education campaign are better perceived, as opposed to the use of 'general media' to fulfill objectives. For example, the information stand that distributed pamphlets and information by posters at a district level was highly valued by citizens, notably in San Blas district. Although the service of FRC and MRC is generally perceived as very useful (55-77% of the sample), it appears the main reasons that citizens use neither the FRC nor MRC is the remoteness of the location of access points together with a lack of awareness about the responsibility of each person with his own hazardous waste.

To increase the efficacy of the 'self access procedure' for recycling used in Madrid City the following recommendations are given. Firstly, the results of the questionnaire emphasized an extension of working time, number of stops and length of the MRC to substitute the demand for the closeness of FRC. An improvement of the signals informing citizens in the proximity of the FRC and of the MRC stops may also be desirable. This represented a common barrier cited by citizens, as 54% of the sample believed that reaching the access point was made difficult because of poor signalling. Citizens indicated a need for more information (e.g., posterior treatment of the waste products, their selective separation, what items can be disposed in the recycling access points) and more facilities. The survey results suggested citizens would appreciate a reward system, such as a return of taxes for separating domestic waste and finance for enterprise in providing infrastructure for small households. Citizens also mentioned the necessity to provide facilities for old people to visit the Recycling Centres. Taylor and Todd (1995) defend facilitation policies in waste management, as a means to improve the

magnitude of correlation between attitude and behaviour (i.e. self-limiting beliefs) and in the levels of responsibility about environmental behaviour.

It is relevant to mention that high scores given to customer satisfaction in the service provided in the FRC and MRC in all districts. However, in general citizens question the example provided by municipal systems in recycling because it is perceived that in many occasions they do not adhere to their own municipal regulations to manage hazardous waste.

## CONCLUSIONS

In conclusion, the results of the survey encourage an extension of education and environmental communication, as well as the procedures for waste management according to the principles given by Del Val (2006) of prevention, reutilization and recycling. However, the cross-municipal boundaries for recycling procedures offer a challenge for Madrid City to develop integrated policy in line with these principles.

Furthermore, besides the factors identified in this study, pro-environmental behaviour such as recycling, depends on many variables at a 'local' level and this may prevent a generalization to other locations and systems. This is why there is still no theoretical framework to interpret results for citizenship in waste management and to provide definitive solutions to all problems (Berenguer, 1998). Therefore, our results lead us to improve the management of domestic hazardous waste in the districts of Madrid City.

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