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THE IMPORTANCE OF ENVIRONMENTAL EDUCATION ON ATTITUDES AND BEHAVIORS FOR HOUSEHOLD WASTE MANAGEMENT IN BLACK SEA REGION, TURKEY

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Abstract: Four waste management concepts as waste reduction, reuse, recycling and best available technology were evaluated with the use of the surveys including of these subjects. It was assumed that environmental values, situational and social characteristics, and psychological factors all play a significant role in the prediction of waste management behavior, within the context of a core intention-behavior relationship. This study was tested on municipal solid waste management survey of the Black Sea Region of Turkey. It was found that the predictors of reduction, reuse, recycling and best available technology behavior differed significantly, with reduction and reuse being predicted by underlying environmental values, knowledge, and concern-based variables. It was determined that the best practices below-average interest in techniques. Recycling behavior was, in contrast, characterized as highly normative behavior.

***Keywords*:** Black Sea region, education, Turkey.

Introduction

Environmental problems such as global warming, air, water and land pollution have attracted the attention all over the world. Environmental problems damage natural resources, and its effect is also dangerous. Municipal solid waste is one of the significant environmental problems. Increasing population level, urbanization and increasing living standards have enhanced the solid waste generation in developing countries (Warunasinghe and Yapa, 2016).

The best and most economical method for sustainable waste management is to minimize the generation of waste (Farrelly and Tucker, 2014; Koolivand et al., 2014). Reduce, reuse and recycle are main components of the waste minimization. Recycling is a key component for waste minimization (Ehrampoush and Baghiani Moghadam, 2005). Recycling converts waste materials to useful materials, reduces the consumption of natural resources and energy usages, prevents environmental pollution. On te other hand, the need for conventional waste disposal is decreased. Although, more than half of all solid waste is recyclable, a substantial amount of recyclable waste is disposed with the garbage (Donnini Mancini et al., 2007). About 60–80% of municipal solid waste is recycled and turns back to the consumption cycle in European countries and the United States. In the Black Sea region, only 5-10% of household waste recycling; however, the remaining municipal solid waste is landfilled using unsanitary and sanitary methods.

People play a significant role in solid waste management processes such as waste generation, source separation, storage, collection, recycling and disposal. However, owing to a lack of public participation and environmental education, recycling programs cannot be carried out exactly in Turkey as in many developing country.

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In this study, a survey consisting of 18 provinces was performed to evaluate their knowledge, attitudes, and practices related to municipal solid waste generation, reduction and management activities. The study has also covered the relationship between demographic variables and public participation towards municipal solid waste management.

Survey Area and Data

The Black Sea region is located in the north of Turkey covering 122.121 km^2 with population size 7.5 million. There are 18 provinces in the region. The locations of the provinces are shown in Figure 1.

Surveys and informal discussions were carried out to gather data from the Turkish Statistical Institute. A deductive approach was selected to gather the data. The municipal solid waste menagement was examined in the Black Sea region as the parts of east and west.

Figure 1. The provinces in the Black Sea region

Results and Discussion

The Black Sea region has all problems suffered by the municipalities such as shortage of dumping area, shortage of physical and financial resources, and etc.

The common curbside waste collection service is employed in the Black Sea region. The municipalities supply stationary containers in the main and sub-main streets in order to collect municipal solid waste. Only metropolitan cities of the region, some municipalities has the second container for recycling wastes such as paper, cardboard, plastics, glass and metals. Households in the metropolitan cities of the region generally prefer to leave out their solid wastes in the evening. However, households' preference for waste collection is the morning in the small cities. Some residents disagree with the time of waste collection due to the possible reasons inluding accessibility, aesthetic aspects, amlodours and health problems.

The collecting services of municipalities is fairly poor services in the Black Sea region. Most of the municipality does not carry out the cleaning and disinfection of containers and does not change old containers with new ones. These municipalities require proper municipality services. Moreover, it is needed promotion of public awareness, and modification of public attitude and behaviour for efficient collecting of municipal solid wastes.

Municipal solid waste generation in the Black Sea region over a 10 year period is shown in Figure 2 as the part of east and west region. The total amount of municipal solid waste generated in the Black Sea region was 1303547 thousand tonnes in 2014. The east Black Sea region generates the lower municipal solid waste than the west Black Sea region. Amount of municipal solid waste in the east and west Black Sea regions are 636645 and 1303547 thousand tonnes, respectively. As seen in Figure 2, municipal solid waste generation decreases during 2002 and 2014 years. This decreases is arised from illegal recycling activities.

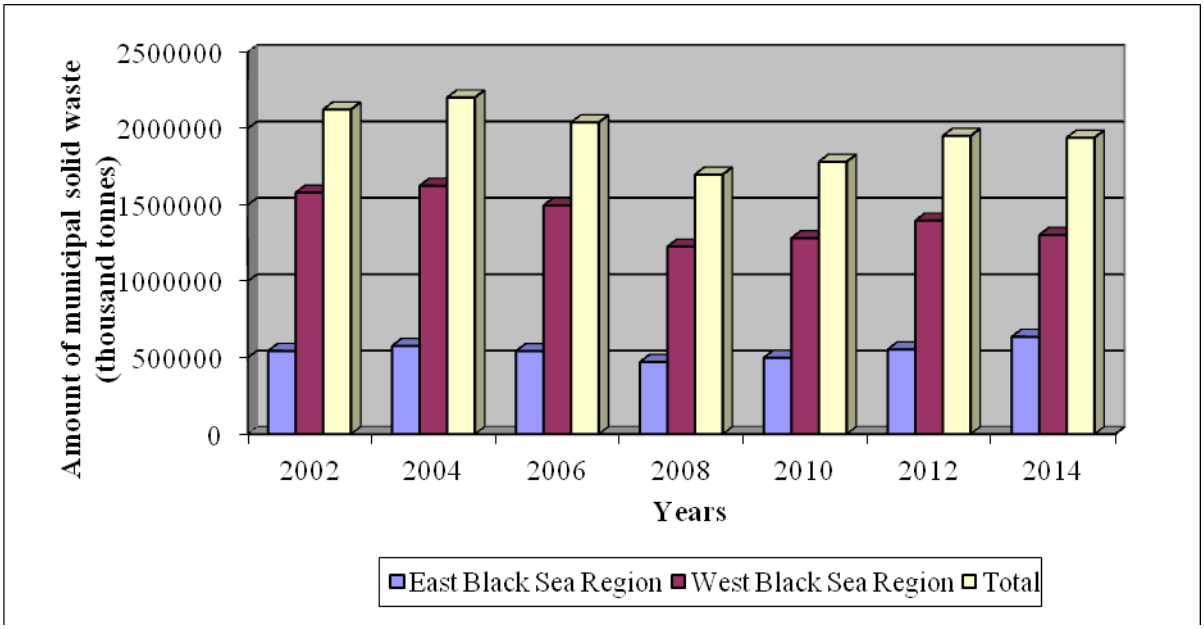

Figure 2. Amount of municipal solid waste in the Black Sea region

The amount of municipal solid waste per capita per day from 2002 to 2014 is given in Figure 3. Amount of municipal solid waste per capita per day in the east and west Black Sea regions are 0.83 and 1.1 kg, respectively. The average municipal solid waste generation rate per capita per day is 0.965 kg in the Black Sea region. In comparison, the per capita per day municipal solid waste generation rate is 1.08 kg in Turkey. As seen the comparison, the average municipal solid waste generation rate of the Black Sea region is lower than that of Turkey.

Source segregation of waste improves the conservation of resources, reduces environmental emissions and saves on cost. All households do not generate the same amount of all waste material fractions. Municipal solid waste generated in the Black Sea region contains up to 30% recyclable materials (paper, cardboard, glass, metals and plastics) in the metropolitan cities. Currently, the recycling activities are conducted in a primitive way. Scavengers salvage paper and carboard, metals, plastics and glass. After these materials are seperated, washed and dried, they are sold to refuse dealers for appropriate pocessing/remolding mills and factories. The Black Sea region has a high biodegradable waste ratio (more than 60%) in both of the east and west parts. High fraction of organic material indicates high moisture content in the wastes.

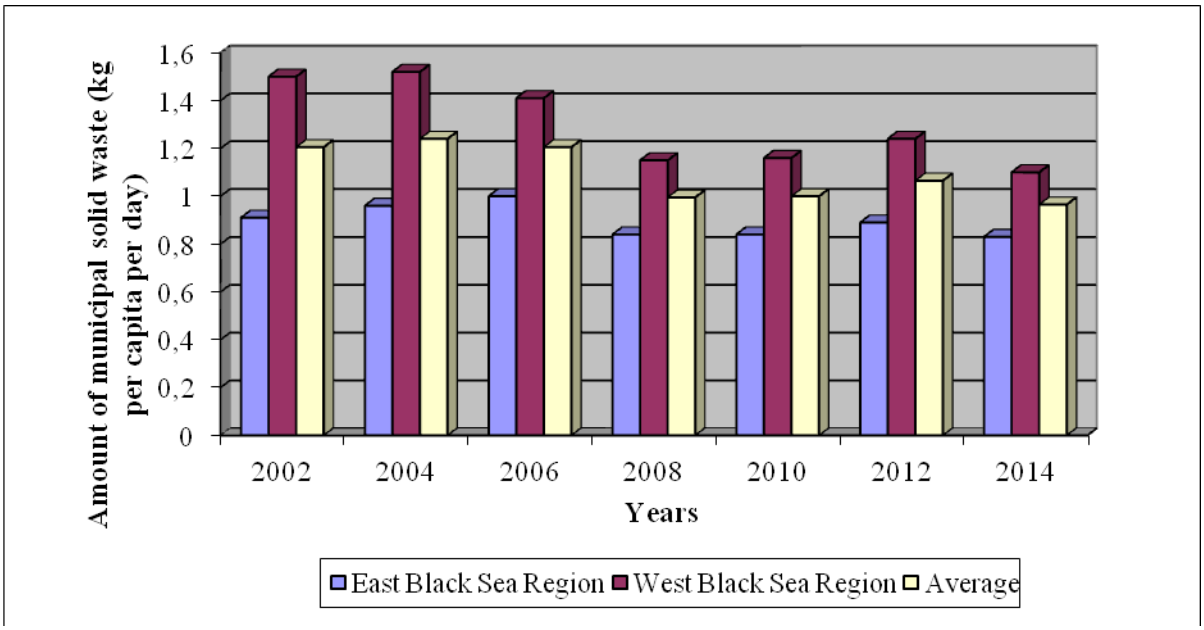

Figure 3. Amount of municipal solid waste in the Black Sea region (kg per capita per day)

Municipal solid wastes collected from containers and collection points is transported to disposal sites. Maximum budget for the solid waste management is devoted to collection and transportation, where it includes salaries of human resources, fuel, maintenance and procurement of vehicles, hence, there is a need to critically analyze the expenditure on manpower, vehicles and other resources to improve efficiency of waste management. Further transportation routes may be optimized to save energy and fuel consumption from collection point to disposal site (Ravindra et al., 2015).

Municipal solid waste disposal methods, according to the Turkish State Statistical Institute's last database (2014), are shown graphically in Figure 4. Open dumping is a common practice in the Black Sea region. In 2014, 1110626 thousand tonnes of municipal solid wastes were disposed of in open dumps. These disposal rate is 55% of total municipal solid waste collected. On the other hand, municipal solid wastes were buried at open areas and were discharged to surface waters by impproper ways in the region at the rate of 3%. Only 42% of municipal solid waste collected is landfilled as sanitary in the region. A total of 1162326 thousand tonnes of municipal solid waste was disposed of without any control in 2014. This situation causes very serious environmental and health problems in the Black Sea region as in many cities of Turkey.

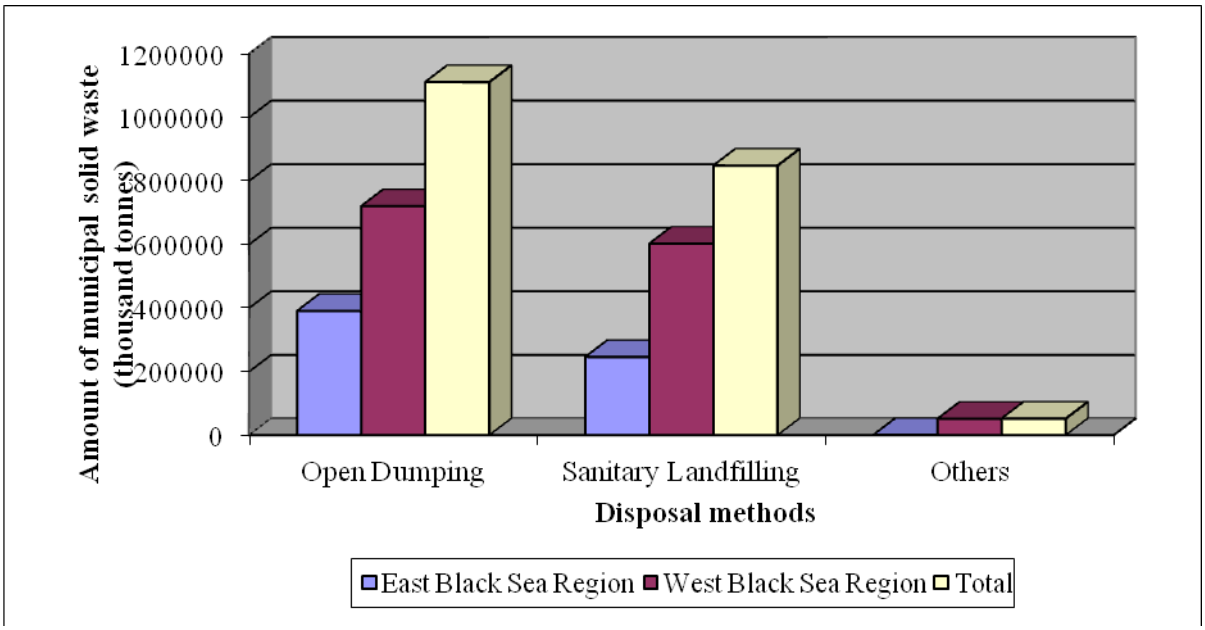

Figure 4. Municipal solid waste amounts by disposal methods in the Black Sea region, 2014

In the past years, the disposal sites were out of the city centers and their direct effects to public health seemed to be less but today they are side by side with the residences due to rapid growth of population and unplanned expansion of the cities. Since then, some of the open dumping sites have been closed and rehabilited.

Public-community participation in the field of households' solid waste management by municipalities is one of the most frequently suggested methods to be pursued in municipal solid waste management in developing countries. For the introduction of any solid waste management method, the necessary conditions are people's awareness regarding the method as well as their willingness to cooperate with the authority, both physically and financially, in conducting such a programme (Chakrabarti et al., 2009).

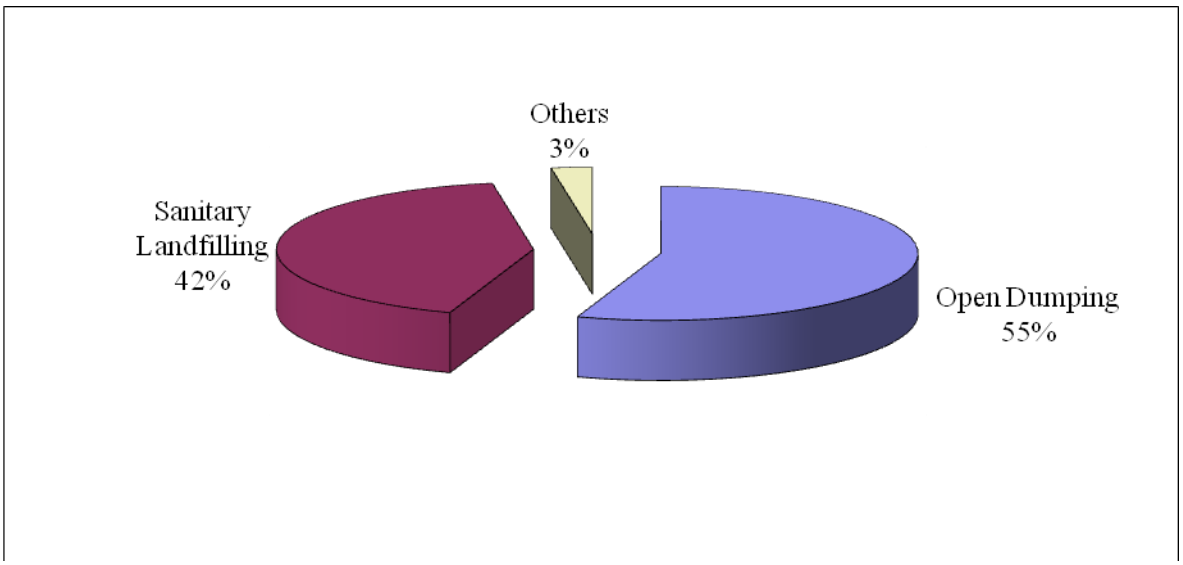

Figure 5. Rate of municipal solid waste disposal methods in the Black Sea Region, 2014

Conclusions

The management of municipal solid waste management is getting more severe due to various reasons such as poor land use and infrastructure, weak technical and financial capacity, lack of enforcement of regulations, poor coordination between authorities, deficient policies and absence of political priorities. Municipal solid waste management starts with understanding public concerns, preferences, knowledge and behaviour. The most cost-effective way of reducing municipal solid waste include public education and citizen encouragement to share in the design of recycling processes. Moreover, public participation strongly affects the success of recycling processes.

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