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CASE STUDY

Factors affecting the rural domestic waste generation

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ABSTRACT: The current study was carried out to evaluate the quantity and quality of rural domestic waste generation and to identify the factors affecting it in rural areas of Khodabandeh county in Zanjan Province, Iran. Waste samplings consisted of 318 rural households in 11 villages. In order to evaluate the quality and quantity of the rural domestic waste, waste production was classified into 12 groups and 2 main groups of organic waste and solid waste. Moreover, kriging interpolation technique in ARC-GIS software was used to evaluate the spatial distribution of the generated domestic waste and ultimately multiple regression analysis was used to evaluate the factors affecting the generation of domestic waste. The results of this study showed that the average waste generated by each person was 0.588 kilograms per day. with the share of organic waste generated by each person being 0.409 kilograms per day and the share of solid waste generated by each person being 0.179 kilograms per day. The results from spatial distribution of waste generation showed a certain pattern in three groups and a higher rate of waste generation in the northern and northwestern parts, especially in the subdistrict. The results of multiple regression analysis showed that the households' income, assets, age, and personal attitude are respectively the most important variables affecting waste generation. The housholds' attitude and indigenous knowledge on efficient use of materials are also the key factors which can help reducing waste generation.

KEYWORDS: *Khodabandeh County; Kriging interpolation; Multiple regression analysis; Rural household; Waste generation.*

INTRODUCTION

Population growth, rural and urban development, lifestyle changes and the consequent change in household consumption patterns have created problems in modern societies. The change of household consumption pattern has changed the waste volume and the waste characteristics or composition. (Aziz *et al.,* 2011; Widyaningsih *et al.,* 2015). Little attention has been paid to rural domestic waste (DW) in most of the developing countries. For this reason, one of the most challenging problems in this countries, is production of waste (Zeng *et al.,* 2016) In fact, waste management is one of the new issues in developing countries, which urges them to develop and implement effective, necessary and integrated management plans for waste generation prediction (Batinic *et al.,* 2011; Intharathirat *et al.,* 2015). Thus, the quantity of waste produced and collected is one of the most important applications of waste management (Fu *et al.,* 2015). The rate of economic growth and living standards improvement in recent decades have led to changes in some phenomena such as mass production, mass consumption and mass disposal (Weng and Fujiwara, 2011). Along with the quantitative growth in waste generation, the nature of DW has also changed, and share of synthetic waste with complex compounds, especially plastics, glass and hazardous materials is increasingly larger (Karbassi and Heidari, 2015; Vergara and Tchobanoglous, 2012; Gu *et al.,*

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2014). Rapidly increasing population, rising living standards, development of the way of consumerism, developments in the fields of science and technology have caused areas of more growing waste.these factors cause continuously increase in the quantity and variety of domestic waste. Increasing domestic waste and consequences of its degradation in the environment can cause serious damage on environment and population (Arıkana *et al.,* 2017). Agricultural waste in the rural areas, especially animal husbandry, has cascading consequences for the environment and human health, including degradation of air and water quality (Karbassi and Pazoki, 2015; Lia *et al.,* 2016). Waste is the materials generated by human activities and the producer considers them useless. These materials include agricultural, commercial, construction, demolition, hazardous, industrial, household and food wastes (Azizi, 2012; Shitu *et al.,* 2015). In addition, systematic set of rules controlling the production, storage, collection, transportation, processing, and disposal is called waste management. This kind of management includes all administrative, financial, legal, design and engineering issues and considers the most optimal principles of public health, aesthetics, economics, resource conservation, and environmental considerations (Monavari and Amin Shar'ee, 2007). The factors affecting waste generation are different in each area, because in each region, local conditions such as climate, standard of living, technology, customs and culture, economic issues and other factors are different. According to Keser *et al.*, (2011), the rate of waste generation is affected by various factors such as geographical location, season, cycle of using kitchen food waste, collection repetition, features of regional services, on-site processing, people's food habits, economic conditions, recovery and reuse, laws on waste management, local culture and beliefs, population growth, weather conditions and size of households (Abdoli *et al.,* 2012; Keser *et al.,* 2012; Safari, 2013). It seems that the rate of solid waste generation is very different in socioeconomic groups, and the proportion of household income and the number of household members are important (Thanh, *et al.,* 2011; Senzige *et al.,* 2014; Khan *et al.,* 2016). Much of the weight changes in the generated waste are due to the changes in socio-cultural and economic factors including cultural traditions (such as Nowruz in Iran), household income, prices of goods and services consumed, the number of employed people, the size of the household, human' awareness in particularis their attitude and behavior towards waste management, housing typology, floor area of the residence, lifestyle of the family, etc (Foday *et al.,* 2012; Anilkumar and Chithra, 2016; Bakshan *et al.,* 2017; Trang *et al.,* 2017). Such factors affect waste generation in long-term period. Thus, these factors must be carefully analyzed in the models prepared for long-term forecasting. The factors affecting the generation of DW in each region should be analyzed separately, since the results of studies done in other locations cannot be beneficial to make right decisions. The amount of waste generated in each city depends on several factors, among which climate of the area, city population structure and texture, and socio-economic and cultural conditions can be mentioned as the most important ones (Abdoli, *et al.,* 2010; Abdoli *et al.,* 2016). Several studies have been conducted in the field of domestic waste generation (DWG). In a study by Darban Astane and Bazgir (2015), the potential and positioning of rural waste management system in Ilam Province was evaluated. They found that only 26 villages have waste collection vehicle and machinery while other villages remain impoverished. The results of their study also show that with a balanced allocation of existing equipments, all villages would benefit from these services. In a study conducted by Suthar and Singh (2015), the social and economic factors associated with the DWG in Dehradun, India were investigated and the results showed that the quality and quantity of the generated waste were different in various economic and income groups. Also, a significant and positive correlation was observed between family size and waste per capita (Suthar and Singh, 2015). Dangi *et al.,* (2015) examined the generation and management of DW in Tulsipur in Nepal. The results showed that waste generation per capita is equal to 330 g per day, including 46% organic waste, 10% plastics, 6% paper and newspaper, 5% metal, 7% glass and 11% construction waste. Waste management has been one of the most important issues which local authorities, mainly in third world countries, are faced with. Imposing the waste management costs on the budgets of local management is one of the costly consequences associated with this type of management, lack of understanding of the factors that may affect the different stages of waste management and the related links, and the need to empower the whole functional

operating system. Waste management is a complex process that requires a lot of information from different sources such as reliable data regarding waste generation, factors affecting the production and prediction of waste quantity and waste management policy regarding recycling rate (Lebersorger and Beigl, 2011; Zurbrugg *et al.,* 2011). For the establishment of a sustainable society, approaches to reduce, reuse and recycle the source with an efficient waste management system can be effective in reducing the consequences thereof (Tadesse *et al.,* 2008; Phuc Thanh *et al.,* 2010). Although the three approaches are important, in the meantime, decrease in origin is in higher importance and priority because success in this stage will reduce the pressure in other stages. Waste generation takes place under the influence of several factors, and familiarity with the quality and quantity of waste and the related factors is very important for the effective management of waste generation. Meanwhile, comprehensive study of the variables affecting the production and recovery of DW is very essential to track the production mechanism and forecast the future of DW and it is necessary to understand how DWG relates to different social and economic factors (Liu and XW., 2010; Grazhdani, 2016; Tranga *et al.,* 2016). The issue of waste in rural areas has become more important in recent decades due to the increased relationship between the rural areas and the impact of productions and technological products and commodities, as well as the increase in public consumption on the one hand, and the increase of citizens' travel for leisure and tourism and second home development, on the other hand. According to the census in 2011, Khodabandeh central district has 74 villages and 15,000 households. To date, no comprehensive study has been conducted on the status of waste generation in the villages of this city, and there is no exact information regarding the quantity and quality of DW and factors affecting the waste generated. Therefore, the aim of this study is to address these questions: 1) What is the quality and quantity of DWG in rural areas? 2) What are the most important factors affecting the production of DW in rural areas? This study has been carried out in Khodabandeh county of Zanjan Province in Iran in 2016.

MATERIALS AND METHODS

Study area

The central district of Khodabandeh County with an area of 4800 km^2 in the south of Zanjan Province was selected as the study area (Fig. 1). It has three sub-districts namely: Hoomeh, Khara rod, and Kersef

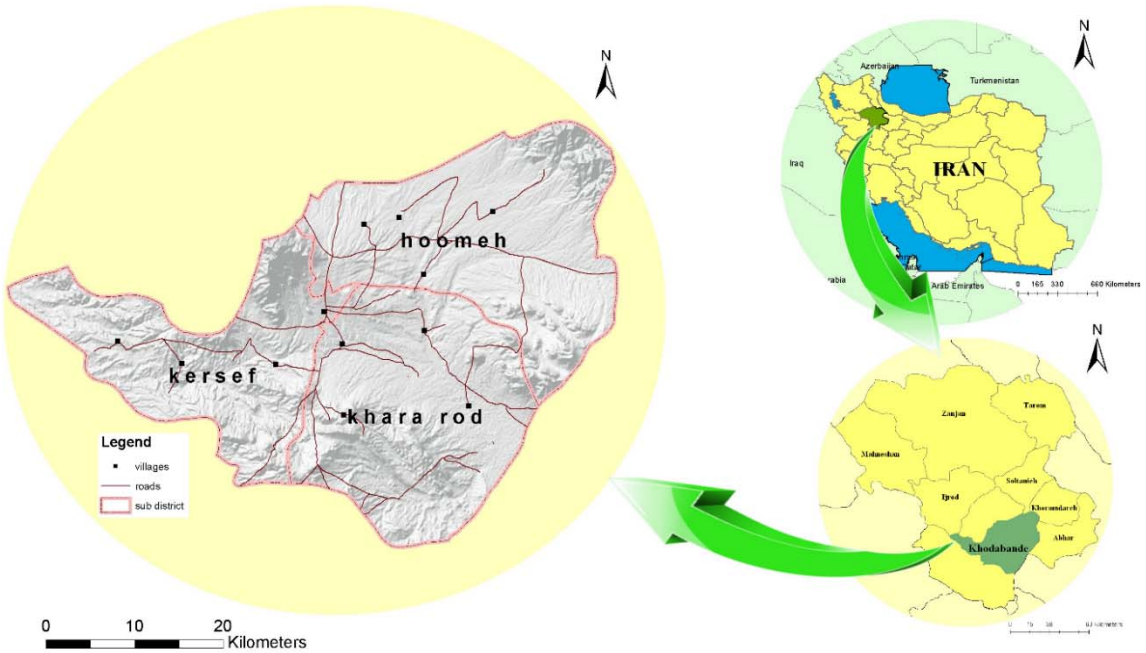

Fig. 1: The study area

and has 74 villages. Based on the census in 2016, the rural population in the study area is 56,342 people. Khodabandeh county is located between 48° 26′ to 48° 36′ E, and 36° 39′ to 36° 4′ N (Statistical Center of Iran, 2016).

Sample size and sampling technique

The statistical population of the study includes the heads of households living in the villages within the central part at the time of study. According to the last census in 2016, the population of rural households is 16,032 people (Statistical Center of Iran, 2016). Cochran formula was used to determine the sample size as expressed in Eq. 1 (Azkyia and D. Astane, 2010).

$$n = \frac{N(t \times s)^2}{Nd^2 + (t \times s)^2} \quad (1)$$

Where, N=15,129, s=0.151 and d=0.02. Accordingly, sample size was calculated as 318 people. To determine the standard deviation and the validity of the questionnaire, pre-test was used randomly among 20 persons. Sampling was conducted during fall and non-holiday periods. In order to determine the subjects, 11 villages were randomly selected in different classes of the population, and the number of samples was chosen fitting the rural population. The name of each village and the sample size are listed in Table 1.

Research techniques

A questionnaire, which was designed on the basis of variables, was used to collect the required data. It was designed in 4 parts to include personal characteristics (gender, age, education, family size, occupation and household income), the amount of waste generation (food waste, vegetable, fruit waste, bread, paper, plastics, perishable materials, scrap metal, glass, textiles, construction waste, wood and rubber), and waste collection methods in rural areas and the attitude of villagers towards waste production (separation of organic and solid waste, participation in waste management, solid waste reuse, attitude towards garbage collection). A total of 325 questionnaires were distributed. After completing the questionnaires, 10 of them were removed from data analysis process due to some bugs. Questionnaire validity was assessed with the help of experts in the pre-test stage, and was approved after some reforms. To calculate household waste generation, the amount of household waste was asked on daily, weekly, monthly, quarterly and annual bases. When inserting data into SPSS software, the data were sorted in the form of daily amount of waste produced by a single person. Correlation tests and linear stepwise regression were used to examine the relationship between waste generation per capita and independent variables.

RESULTS AND DISCUSSION

Personal characteristics

In this study, personal characteristics of individuals and families including respondents' gender, age and the average age of family, individual and family education, family size, occupation of the head of household, income and assets of individuals were studied:

Gender: Based on the results, 98.2% of the subjects were male and 1.8 were female.

Age: The age of the studied population was in the range of 15 to 67 and the average age was 35.10 years. The age of families was in the range of 15.33 to 67 years and the average age was 35.27 years.

Education: Based on the results, 21.8% of respondents had secondary education as the largest responsive group. The value of this variable among

Table 1: Demographic status of studied villages

Sub-district	Villages	Population	Household	Sample size (person)
Hoomeh	Gondere	898	261	15
	Nazar goli	1051	280	16
	Bijghin	1077	276	15
	Vajoshan	726	181	10
Khararod	Abi sofla	1857	502	28
	Mhamodabad	2906	782	42
	Enche	1619	442	25
	Khalegh abad	951	253	14
Kersef	Paskohan	1157	328	18
	Hesar	1785	441	25
	G. mohamad	647	172	10

(Statistical Center of Iran, 2016)

the same families (secondary education) is 9.1%. 37.6% of the households were illiterate in average. This group had the highest average.

Family size: 14.5% of the population had a two-person family, 12.1% had a three-person family, 16.4% had a four-person family, 29.1% had a five-person family, and 27.9% had a family with more than five persons.

Occupation: Results show that 44.8% of respondents were farmers, 35.8% were self-employed, 12.7% were livestock producer, 3% were employees and 3.6% had other jobs.

Income level: More than 79.4% of the respondents had an income less than 270 US dollars ($) a month, 20% earned between 270 and 540 $, and 0.6% made between 540 and 810 $ a month.

Waste generation

To evaluate waste generation, two groups of organic and solid waste were investigated. Waste materials are produced in varying frequencies: daily, weekly, monthly, quarterly and yearly. The collected data in all groups was converted into daily generation of waste per person. The results show that the average waste generation is 0.588 kg per person per day, including 0.409 kg per person per day for organic waste and 0.179 kg per person per day for solid waste. On average, food waste, vegetable, fruit and bread wastes, with the values of 0.149, 0.143 and 0.107 g per person per day, respectively, ranked among the highest daily generation of waste. This was followed by solid perishable materials, construction wastes and paper waste with the values of 62, 51 and 18 g per person per day, respectively (Fig. 2).

Waste generated in villages

Review of the generated waste by waste types in the villages using ANOVA test led to classification of the studied villagaes into two groups for solid waste. Nazar goli and Gondere villages were placed in a group with highest generation of solid waste by waste generation of 0.636 and 0.297 kg per person per day, respectively. In organic waste group, test results showed no significant difference, and waste generation was swinging in the range of 0.180 and 0.627 kg per person per day in villages of Hesar and Khalegh abad, respectively. According to the results from the total waste generation, the villages were listed into two groups and the detailed information was presented (Table 2).

Studying waste generation, based on the spatial distribution of villages, shows that household waste generation has a certain pattern in all three groups, and waste generation in the north and north-west, especially in the village of Hom'e is in higher status (Fig. 3). It is located near the city center and in other words, it can be said that villages adjacent to the city center have higher waste generation per capita.

Waste collection

The results show that the majority of organic waste is used by livestock and only 10.3% is collected by

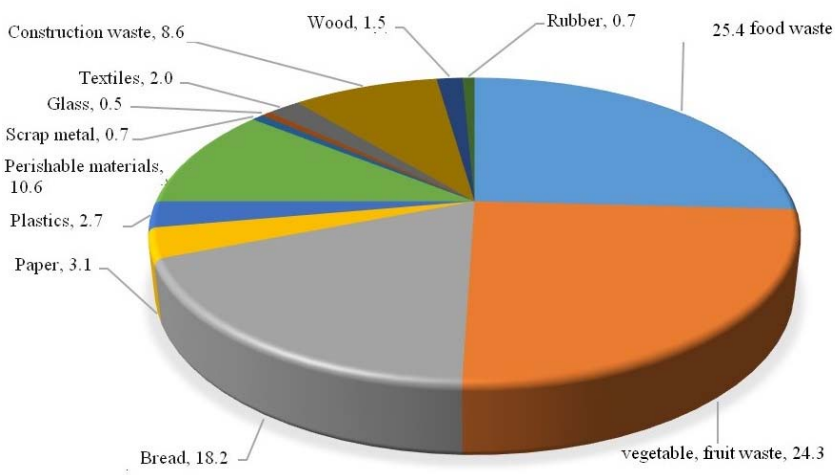

Fig. 2: Percentage of household waste generation by types

Table 2: Comparison of average household waste generation in the villages

Solid waste			Organic waste		Total waste		
Villages	Subset for alpha = 0.05		Villages	Subset for alpha = 0.05	Villages	Subset for alpha = 0.05	
	1	2				1	2
Khalegh abad	0.072		Hesar	0.180	Abi sofla	0.303	
G. mohamad	0.087		Abi sofla	0.193	Hesar	0.305	
Enche	0.094		paskohanP	0.211	Paskohan	0.332	
Vajoshan	0.107		Mhamodabad	0.260	Mhamodabad	0.443	0.4429
Abi sofla	0.109		Nazar goli	0.355	Enche	0.470	0.4707
Bijghin	0.118		Enche	0.377	G. mohamad	0.504	0.5043
Paskohan	0.120		G.mohamad	0.417	Bijghin	0.546	0.5460
Hesar	0.124		Bijghin	0.428	Vajoshan	0.560	0.560
Mhamodabad	0.182		Gondere	0.437	Khalegh abad	0.700	0.700
Gondere	0.297	0.298	vajoshanV	0.553	Gondere	0.735	0.735
Nazar goli		0.636	Khalegh abad	0.628	Nazar goli		0.990
Sig.	0.372	0.104	Sig.	0.070			

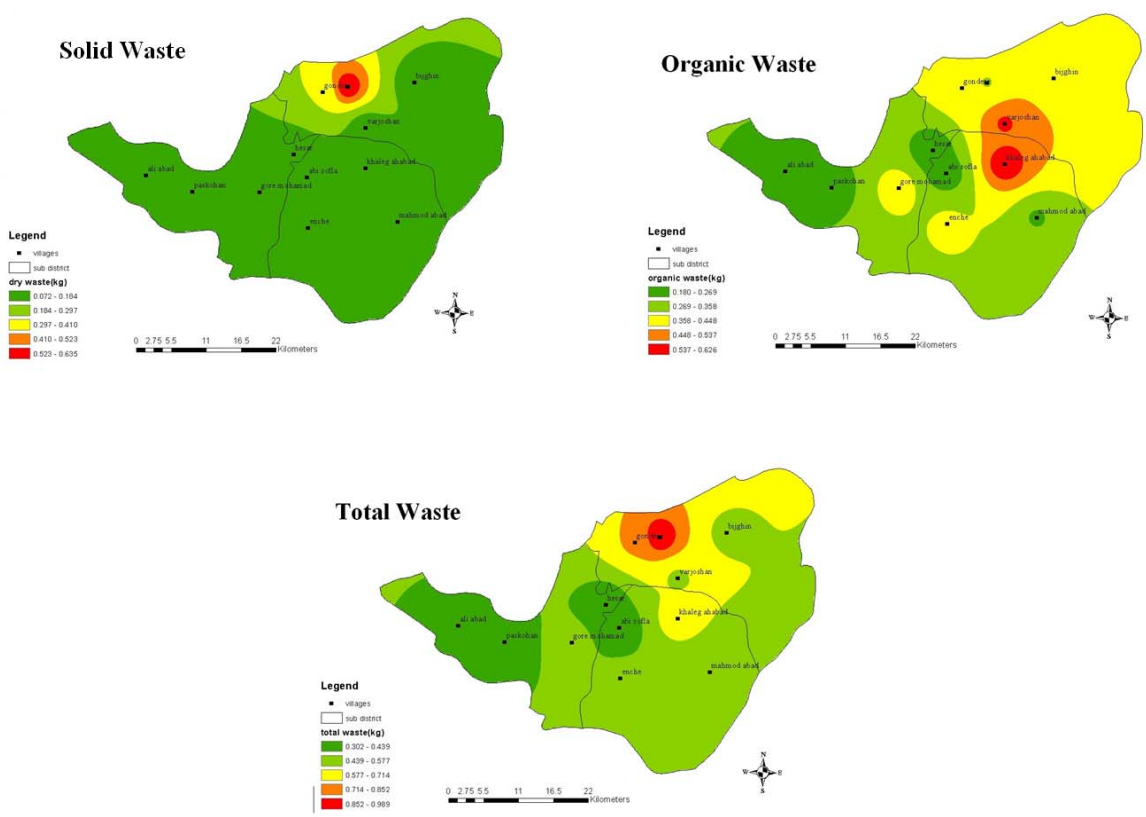

Fig. 3: Waste generation spatial interpolation in the study area

rural governorate. However, 65.2% of the solid waste is collected by rural governorate, 29.3% of people sell a part of their waste and 5.5% of the respondents said that they pile up their waste somewhere near the village (Table 3).

In terms waste collection period, 92.7% of waste is collected three times a week and 4.8% of it is collected weekly. Studies also show that the average payment to the rural governorate per rural household and per capita for waste collection is 1.87 and 0.39 $US per month, respectively.

Attitudes of people

One of the factors that can affect people's behavior

is their attitudes. The attitude of people towards the waste oriented issues was gathered through questionnaire. The obtained data are listed in Table 4. The results show that the average satisfaction with waste collection by rural governorate in the range of 1 to 5 is 3.15. Regarding the organic and solid waste separation, the familiarity of the population with separation is 3.19, and the importance of its implementation with a score of 3.92 indicates the its importance among the villagers. One of the variables considered in this context is the attitude of the villagers towards participation in waste collection. The results indicate that the average rates of willingness to participate in waste collection and contribute to the payment of more charge for improved sanitation are 3.82 and 3.78, respectively.

The details on reuse of solid waste are given in Table 4. The people's average attitude towards reuse of additional objects scored 4 and their attitude towards the necessity of disposing additional objects scored 3.63. Moreover, majority of the people (with the score of 4.62) agree with the necessity of warning those who throw their garbage in the village and some of them (with the score of 3.01) emphasized on lack of necessity warning and that the rural governorate must do its duty to collect the waste (Table 4).

Factors affecting the waste generation

At this stage, using stepwise linear regression, the factors affecting the DWG were investigated. Afterwards, the results of separation of solid waste, organic waste and total generated waste were calculated. Based on the results from the model, the best output belonged to organic waste in a way that the multiple correlation coefficient and determination coefficient were 0.596 and 0.343, respectively. The next model for the total generated waste indicated correlation coefficient and determination coefficient of 0.519 and 0.25, respectively. The weakest model was the model for solid waste whose determination coefficient was 0.083 (Table 5).

Investigation of the variables in the three models shows that in the model for total waste generation, households' income, age, assets and personal attitude are the most effective variables. In the model for organic waste, variables of income, age and personal attitude, as well as in the third model, variables of income and personal attitude are significant. The findings indicate that in all models, variable of age has a negative impact on waste generation and waste

Table 3: DW collection and disposal of organic and solid waste

Solid waste	(%)	Organic waste	(%)
Collected by rural government	10.3	Collected by rural government	65.2
Consumed by livestock	89.1	Piled up somewhere near the village	5.5
Excreted in the garden or basement	0.6	A part of waste id sold	29.3
Total	100	Total	100

Table 4: The population's attitude towards waste management in the village

Component	Item
Satisfaction with the performance of rural governorate	
Separation of organic and solid waste	The need to separate organic and solid waste
	Learn how to separate organic and solid waste
Participation in waste management	Willingness to participate in garbage collection
	In the case of improved sanitation in the village, willing to pay more for waste charge
Solid waste reuse	Re-using superfluous objects as much as possible
	Superfluous or useless things should be thrown away
Attitude towards garbage collection	Those who throw their garbage in the village should be warned
	Warning is not necessary, rural governorate has a duty to collect waste

Table 5: Multiple correlation coefficients and determination coefficient

Total waste generation			Organic waste generation			Solid waste generation		
R	Adjusted R	SE	R	Adjusted R	SE	R	Adjusted R	SE
0.519	0.250	0.622	0.596	0.343	0.371	0.309	0.083	0.550

*SE: Standard error

Table 6: Results of multiple regression analysis

Total waste generation				Organic waste generation				Solid waste generation			
Variable	B	Beta	Sig.	variable	B	Beta	Sig.	variable	B	Beta	Sig.
Income	0.207	0.304	0.000	Income	0.184	0.423	0.000	Income	0.316	0.276	0.001
Age	-0.004	-0.191	0.014	Age	-0.002	-0.191	0.006	Personal attitude	0.091	0.165	0.037
Assets	0.365	0.252	0.001	Personal attitude	0.059	0.214	0.006				
Personal attitude	0.079	0.184	0.032								

Table 7: Result of Duncan's multiple range test for comparison between the types of occupation

Total			Organic			Solid	
Job	Subset of alpha = 0.05		Job	Subset of alpha = 0.05		Job	Subset of alpha = 0.05
	1	2		1	1		1
Laboror	0.3571		Laboror	0.2514		Laboror	0.0774
Rancher	0.3623		Office worker	0.3070		Rancher	0.1109
Office worker	0.4732		Rancher	0.3093		Office worker	0.1541
Farmer	0.5265		Farmer	0.3252		Farmer	0.2296
Self-employed		2.1350	Self-employed		1.7771	Self-employed	0.3580
Sig.	0.602	1.000	Sig.	0.743	1.000	Sig.	0.287

generation decreases with the increase of the age of household head. Additionally, in all models, income variable is the most important factor affecting the waste generation (Table 6).

Impact of the type of occupation

The one-way analysis of variance was used to study the impact of the type of occupation on generation of domestic waste, (Table 7). The tests show that the highest amount of waste generation in all three occupational groups is related to the group of private sector activity in the service and industrial sector, and the lowest amount of waste is generated by workers. In the organic waste group, the share of farmers and ranchers, placed after the share of private sector, is high and this could be partially related to the use of the products of farmers and ranchers.

CONCLUSION

Reducing DWG in towns and villages is one of the key strategies to protect the environment, preserve natural resources and reduce the costs of waste collecting and recycling. Familiarity with the quality and quantity of the waste generated by households is effective in management strategies. This study aimed to assess the quality and quantity of DWG and to identify the effective social and economic factors. The results showed that the average waste generation by one person is 0.588 kg per day, with the shares of 0.409 kg organic waste and 0.179 kg solid waste generetaed by one person per day. The averages of food waste, vegetable waste, and fruit and bread wastes generated by one person are 149, 143 and 107 g per day, respectively. It was found that a number of factors including income, age, amount of assets, the type of individual's attitudes and their occupation can effect the DWG. People with high income levels and financial ability generate more waste because they can buy more groceries. This result is consistent with the results of most studies, such as Thanh, *et al.,* 2011; Senzige *et al.,* 2014; Khan *et al.,* 2016. The results showed that older people tend to produce less waste due to greater life experience, indicating the significant role of experience and knowledge. In addition it was found that a non-cooperative attitude towards waste management can lead to more waste generation. In other words, non-cooperative and constructive spirit in rural management is a barrier to waste management. According to the obtained results and and considering the short-term experience of rural management in the field of waste management, and limited familiarity of villagers with the problems of waste collection and disposal, it seems that the best method, besides proper and scientific planning for waste collection and disposal, is to educate and inform villagers about the necessity of cooperation with rural governorate and authoroties.

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CONFLICT OF INTEREST

The author declares that there is no conflict of interests regarding the publication of this manuscript.

ABBREVIATIONS

B	Regression coefficient
Beta	Standardized regression coefficient
DW	Domestic waste
DWG	Domestic waste generation
E	East
Eq.	Equation
g	Gram
Kg	Kilogram
Km²	Square kilometer
N	North
R	Coefficient of determination
SE	Standard error
Sig.	Signification
%	Percent
$	Dollar

REFERENCES

Abdoli, M.; FalahNezhad, M.; Salehi, R.; Behboudian, S., (2012). Long-term forecasting of solid waste generation by the artificial neural network. Environ. Prog. Sustainable Energy, 31: 628–636 **(9 pages)**.

Abdoli, M.; Fallahnejad, M.; Ghazban, F.; Ardestani, M., (2010). Assessment of variables affecting urban waste generation. Proceedings of the 4th Conference and Exhibition of Environmental Engineering, Tehran, 15-16 May, 35-48 **(14 pages)**.

Abdoli, M.A.; Rezaei, M.; Hasanian, H., (2016). Integrated solid waste management in megacities. Global J. Environ. Sci. Manage., 2(3): 289-298 (**10 pages**).

Arıkana, E.; Şimşit-Kalenderb, T.Z.; Vayvayb, Ö., (2017). Solid waste disposal methodology selection using multi-criteria decision making methods and an application in Turkey. J Clean Prod., 142: 403-412 (**10 pages**).

Anilkumar, P.P.; Chithra, K., (2016). Land use based modelling of solid waste generation for sustainable residential development in small/medium scale urban areas. Procedia. Environ. Sci., 35: 229-237 (**9 pages**).

Azkyia, M.; D. Astane, A.R., (2010). Applied research methods. Keyhan pub, Tehran (**538 pages**).

Aziz, Sh.; Aziz, H.A.; Bashir, M.; Yusoff, M.S., (2011). Appraisal of domestic solid waste generation, components, and the feasibility of recycling in Erbil, Iraq. Waste Manage. Res., 29: 880–887 (**8 pages**).

Azizi, A., (2012). Analysis of citizens' participation in waste management. Proceedings of Fourth National Student Conference Geography., Tehran, 5-6 Nov, 215-228 **(14 pages)**.

Bakshan, A.; Srour, I.; Chehab Gh.; El-Fadel, M.; Karaziwan, J., (2017). Behavioral determinants towards enhancing construction waste management: A Bayesian Network analysis. Resour, Conserv. Recy., 117: 274–284 (**11 pages**).

Batinic, B.; Vukmirovic, S.; Stanisavljevic, N.; Ubavin, D.; Vukmirovic, G., (2011). Using ANN model to determine future waste management targets-case study of Serbia. J. Sci. Ind. Res., 70: 513–518 **(7 pages).**

Darban Astane, A.R.; Bazgir, S., (2015). Evaluation and selection of rural waste management systems (Case Study: Ilam Province). J. Urban and Rural Management., 39: 115-126 **(12 pages)**.

Foday, P.S.; Xiangbin, Y.; Alhaji, M.H.C., (2012). A situational assessment of socioeconomic factors affecting solid waste generation and composition in Freetown, Sierra Leone. J. Environ. Protect., 3:563-568 (**6 pages**).

Fu, H.Z.; Li, Z.S.; Wang, R.H., (2015). Estimating municipal solid waste generation by different activities and various resident groups in five provinces of China. Waste Manage., 41: 3–11 **(9 pages)**.

Grazhdani, D., (2016). Assessing the variables affecting on the rate of solid waste generation and recycling: An empirical analysis in Prespa Park, Waste Manag., 48: 3–13 **(11 pages)**.

Gu, B.X.; Fujiwara, T., (2009). Estimation household wastes generation based on household con-sumption expenditure: a case study of Okayama, The 20th Annual Conference of Japan Society of Material Cycles and Waste Management., 20: 42–43 **(2 pages)**.

Karbassi, A. R.; Heidari, M., (2015). An investigation on role of salinity, pH and DO on heavy metals elimination throughout estuarial mixture. Global J. Environ. Sci. Manage., 1(1): 41-46 (**6 pages**).

Karbassi, A.R.; Pazoki, M, (2015). Environmental qualitative assessment of rivers sediments Global J. Environ. Sci. Manage., 1(2): 109-116 (**8 pages**)

Keser, S.; Duzgun, S.; Aksoy, A., (2012). Application of spatial and non-spatial data analysis in determination of the factors that impact municipal solid waste generation rates in Turkey. Waste Manage., 32(3): 359-371 **(13 pages)**.

Khan, D.; Kumar, A.; Samadder, S.R., (2016). Impact of socioeconomic status on municipal solid waste generation rate, Waste Manage., 49: 15-25 **(11 pages)**.

Lia, F.; Chenga, Sh.; Yua, H.; Yangb, D., (2016). Waste from livestock and poultry breeding and its potential assessment of biogas energy in rural China, J Clean Prod., 126: 451-460 (**10 pages**).

Liu, C.L..; Wu, X.W., (2010). Factors influencing municipal solid waste generation in China: A multiple statistical analysis study, Waste Manage. Res., 29: 371–378 (**8 pages**)

Monavari, M.; Amin Shar'ee, F., (2007). Management and design of collection of municipal solid waste. Jahad Daneshgahi, Amir Kabir Publication, Tehran, Iran (**256 page**).

Safari, A., (2013). Environmental risk analysis and strategies for waste management in rural areas, Case Study: Central Ajarvd district in Germi County. J. Econ. space and Rural Development., 3: 79-91 **(13 pages)**.

Senzige, J.P.; Makinde, D.O.; Njau, K.N.; Nkansah-Gyeke, Y.; (2014). Factors influencing solid waste generation and composition in urban areas of Tanzania: Case of Dar-es-Salaam. Am. J. Environ.Protect., 3 : 172-177 **(6 pages)**.

Shitu, A.; Izhar, S.; Tahir, T.M., (2015). Sub-critical water as a green solvent for production of valuable materials from agricultural waste biomass: A review of recent work. Global J. Environ. Sci. Manage., 1(3): 255-264 (**10 pages**).

Suthar, S.; Singh, P., (2015). Household solid waste generation and composition in different family size and socio-economic groups: A case study. Sustainable Cities Soc., 14: 56-63 **(8 pages)**.

Statistical Center of Iran, (2016). 2016 census results-Zanjan Province (In persian). Statistical center of Iran publication (**55 pages**).

Thanh, N.; Yasuhiro, M.; Takeshi, F., (2010). Household solid waste generation and characteristic in a Mekong Delta city, Vietnam. J. Environ. Manage., 91: 2307- 2321 **(15 pages)**.

Tranga, P.T.; Donga, H.; Toana, D.; Xuan, N.T., (2017). The Effects of Socio-economic Factors on Household Solid Waste Generation and Composition: A Case Study in Thu Dau Mot, Vietnam. Energy Procedia., 107: 253 – 258 (**6 pages**).

Vergara, S.E.; Tchobanoglous, G., (2012). Municipal solid waste and the environment: a global perspective. Annurev. Environ., 37: 287–309 **(23 pages)**.

Weng, Y.C.; Fujiwara, T., (2011). Examining the effectiveness of municipal solid waste management systems: an integrated cost-benefit analysis perspective with a financial cost modeling in Taiwan. Waste Manage., 31: 393–406 **(14 pages)**.

Widyaningsih, N.; Tjiptoherijanto R.; Widanarko, S.; Seda, F., (2015). Linkage model between sustainable consumption and household waste Management. Procedia Environ. Sci., 28: 195-203 (**9 pages**).

Zeng, C.; Niu, D.; Li, H.; Zhou, T.; Zhao, Y., (2016). Public perceptions and economic values of source-separated collection of rural solid waste: A pilot study in China. Resour. Conserv. Recycl., 107: 166–173 **(8 pages)**.

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