

Assessing the Knowledge, Attitude, and Practice of Households in Darmian City with Regard to Municipal Solid Waste Management

Fateme Sahlabadi^{1,2}, Mitra Moodi², Mohsen Sadani³, Sakineh Geraylo⁴, Ahmah Mahmoodiyan⁵, Hasan Mehran Pour⁵

¹Department of Environmental Health Engineering, School of Health, and Social Determinants of Health Research Center, Birjand University of Medical Sciences, Birjand, Iran, ²Social Determinants of Health Research Center, and Department of Public Health, Faculty of Health, Birjand University of Medical Sciences, Birjand, Iran, ³Department of Environmental Health Engineering, and Department of Public Health, School of Public Health, Shahid Beheshti University of Medical Sciences, Tehran, Iran, ⁴Department of Public Health, Faculty of Health, Golestan University of Medical Sciences, Gorgan, Iran, ⁵Department of Environmental Health Engineering, School of Public Health, Birjand University of Medical Sciences, Birjand, Iran

Abstract

Aim: The purpose of this study was to investigate the knowledge, attitude, and practice of households living in Darmian city, South Khorasan, Iran, with regard to municipal solid waste (MSW) management. **Methods:** The quota sampling method was used based on Darmian city zoning. The questionnaire was included questions about knowledge, attitude, and practice in the MSW management domain. Data were analyzed by SPSS version 18 (SPSS Inc, Chicago) using descriptive statistics and appropriate nonparametric statistical tests. **Results:** The findings showed that the mean score of knowledge was 8.53 ± 2.46 , of attitude was 16.60 ± 2.70 , and of practice was 3.02 ± 1.10 . It was found that the implementation of management plans could improve health and environmental aspects. **Conclusion:** According to the findings, the scores of knowledge and practice were higher among urban residents than rural ones. Therefore, proper planning for improving the cultural level of rural residents in this regard should be considered. To increase participation in waste separation and recycling practices, educational campaigns and mass media can be used as one of the effective educational strategies.

Keywords: Attitude, Darmian, knowledge, municipal solid waste management, practice

INTRODUCTION

The importance of sanitary waste management is undeniable in protecting the environment and human health.^[1] These wastes affect the earth, climate, and human health.^[2] The generation of solid wastes and their distribution in the environment are one of the most important problems of the human society, which is increasing with population growth.^[3] Solid waste can be categorized in terms of usage, material, physical properties, origin, and safety parameters.^[4] The generation of waste is one of the factors that lead to human-animal confront, which ultimately can cause economic, environmental, and biological losses.^[5] Pathogens in the waste can spread to the environment and contaminate water sources.^[6] As a means of protecting the environment, waste recycling activities have attracted attentions in many countries. It has also been argued that recycling activities are economical and logical solutions for

the comprehensive management of waste disposal.^[7] Providing a proper disposal management can be a challenging duty to serious health problems associated with population growth and rapid development of urbanization in many societies,^[8] and given that waste management operations are not fully or appropriately implemented in developing countries.^[9] The best and most cost-effective way to manage waste is to reduce waste generation.^[10,11] Household wastes constitute the absolute majority of municipal solid waste (MSW)

Address for correspondence: Dr. Sakineh Geraylo, Department of Public Health, Faculty of Health, Golestan University of Medical Sciences, Gorgan, Iran. E-mail: geraylo65@yahoo.com

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Sahlabadi F, Moodi M, Sadani M, Geraylo S, Mahmoodiyan A, Pour HM. Assessing the knowledge, attitude, and practice of households in Darmian City with regard to municipal solid waste management. *Int J Env Health Eng* 2024;13:34.

Received: 06-01-2020, **Accepted:** 15-08-2021, **Published:** 31-12-2024

Access this article online

Quick Response Code:



Website:
<https://journals.lww.com/IJEH>

DOI:
10.4103/ijehe.ijehe_3_20

resources, and allocate most municipal waste management costs to themselves.^[12] Although more than half of all solid waste can be recycled, a significant amount of recycled waste is discarded.^[13] The contribution of people in the segregation and recycling of urban solid wastes is a critical issue for the success of MSW management.^[14] Recycling plans should be designed with the aim of enhancing community's environmental knowledge, attitude, as well as behavior in this regard.^[15] Therefore, there is a fundamental need for accurate surveys to understand the mechanisms of citizen participation in waste management plans.^[16] It is not possible to reach the goal of waste disposal proper management, except by exploring different cultures and attitudes toward waste collection, transfer, and disposal. Therefore, the present study was conducted to determine knowledge, attitude, and practice of Darmian inhabitants in the field of MSW management.

MATERIALS AND METHODS

This descriptive cross-sectional study was performed on households living in Darmian city, South Khorasan, Iran. The required sample size was estimated as 256 based on the formula of $n = z^2pq/d^2$, the results of Sadeh *et al.*'s study,^[17] 95% confidence interval, $\beta = 0.8$, and $d = 0.05$. Accordingly, 260 samples were selected for assurance. Stratified random sampling was done while considering the zoning of Darmian city and population of each region. The participants were initially ensured about confidentiality of the information, and oral consents were obtained from them before distributing the questionnaires. Later, the study objectives were explained to them, and written informed consent forms were obtained from each participant. Finally, the participants were asked to complete the self-reporting questionnaires. The data collection tool was Solid Waste Management Questionnaire, which was used in Safdari *et al.*'s study.^[18] The validity of the questionnaire was confirmed by a panel of experts and its reliability was assured by conducting a pilot study on 30 samples and calculating Cronbach's alpha. This questionnaire consists of 41 questions arranged in 4 sections. The first section is allocated to demographic questions, and the second section is related to awareness questions ($n = 14$) which are scored on the scale of 0–1. Attitude questions form the third section ($n = 5$) which are scored using a five-point Likert scale (“strongly agree,” “agree,” “undecided,” “disagree,” and “strongly disagree”). The fourth section is allocated to questions of solid waste management practice ($n = 11$). The latter section includes yes/no and multiple questions.

Data collection through completing questionnaire was done by self-report method. Data were analyzed using SPSS 18 and descriptive statistics (frequency distribution, mean, and standard deviation) and analytic statistics (nonparametric tests of Mann–Whitney and Kruskal–Wallis at $\alpha \leq 0.05$) given that the distribution of mean scores of knowledge, attitude, and practice was not normal.

RESULTS

In this study, the age range of participants was between 15 and 70 years old. Among 260 participants, 165 (63.5%) were male and 95 (36.5%) were female, 82.3% were married, and 61.9% lived in the village. Most of the participants were self-employed (43.1%). Their spouses had mostly elementary education ($n = 113$, 43.5%), and 76.9% of them were housewives [Table 1].

As shown in Table 2, the mean score of knowledge was 8.53 out of 14 points, of attitude was 16.60 out of 25 points, and of practice was 3.02 out of 5 points.

As shown in Table 3, in most of participants' living places, wastes were collected by waste collection truck once a week (55.4%). In most regions, waste collection time was between 7 AM and 11 AM (64.2%), and 33.1% of the participants were satisfied on average with the way of waste collection. Findings showed that 51.5% of the participants used a waste can for storing waste, 60% of participants took the garbage out early morning, and 64.2% of participants performed waste separation, out of whom 37.3% dividing waste into dry and wet. Most of the participants delivered their garbage to itinerant waste-pickers (29.2%). In addition, we found that most of the studied individuals washed garbage trash

Table 1: Distribution of absolute and relative frequency of demographic characteristics of the participants

Variable	Category	n (%)
Gender	Male	165 (63.5)
	Female	95 (36.5)
Marital status	Single	46 (17.9)
	Married	214 (82.3)
Level of education	Primary school	22 (8.5)
	Secondary school	54 (20.8)
	Sub diploma	53 (20.4)
	Diploma	79 (30.4)
	Academic	52 (20)
Occupation	Employee	70 (26.92)
	Self-employed	112 (43.1)
	Worker	62 (23.84)
	Retired	10 (3.84)
	Unemployed	6 (2.3)
Economic status	Weak	64 (24.6)
	Moderate	126 (48.5)
	Good	70 (26.9)

Table 2: Participants' mean scores of knowledge, attitude, and practice regarding municipal solid waste management

Variable	Minimum	Maximum	Mean ± SD
Knowledge	3	14	8.53±2.46
Attitude	9	25	16.60±2.70
Practice	0	5	3.02±1.10

SD: Standard deviation

Table 3: Frequency distribution with respect to waste management in the living place of the participants

Variable	n (%)
Type of garbage collection vehicle	
Hand cart	24 (9.3)
Waste collection truck	161 (61.9)
Pickup truck	75 (28.8)
Frequency of garbage collection	
Everyday	9 (3.5)
Every other day	54 (20.8)
Twice a week	38 (14.6)
3 days a week	15 (5.8)
Once a week	144 (55.4)
Garbage collection time	
Early in the morning before 7 o'clock	59 (22.7)
Between 7-11 AM	167 (64.2)
Between 4-7 PM	6 (2.3)
Between 7-9 PM	16 (6.2)
After 9:00 PM	12 (4.6)
Satisfactions with the current way of waste collection	
Very little	26 (10)
Little	36 (13.8)
Average	86 (33.1)
High	67 (25.8)
Very high	45 (17.3)
Type of waste container	
Waste can	134 (51.5)
Garbage bag	99 (38.1)
Every available dish	27 (10.4)
Time of taking out garbage	
One night before waste collection	35 (13.5)
Early morning	156 (60)
Afternoon	10 (3.9)
An hour before waste collecting	59 (22.7)
Doing waste separation	
Yes	167 (64.2)
No	93 (35.8)
Waste separation type	
Separation of wet and dry waste	97 (37.3)
Separating plastics and paper	45 (17.3)
Separating glass and metals	25 (25)
Waste delivery to waste collection agents	
Itinerant waste-pickers	76 (29.2)
Recycling organization	32 (12.3)
Garbage collector	59 (22.7)
Frequency of washing waste containers	
After each evacuation	87 (71.9)
Once a week	32 (12.3)
Every day	34 (13.1)
Never	7 (2.7)
Way of washing waste collect container	
Just with water	89 (34.2)
Disinfecting agents	88 (33.8)
Detergents	78 (30)

can after each waste evacuation (71.9%), but most of them washed garbage trash can only with water (34.2%) [Table 3].

The results of Mann–Whitney test showed a statistically significant difference between the means of attitude scores in terms of gender so that the attitude mean score of men was higher than that of women ($P = 0.04$). There was a significant difference between means of knowledge scores with respect to marital status ($P = 0.02$) and mean score of knowledge and practice in the place of residence variable ($P \leq 0.001$) [Table 4].

Kruskal–Wallis test showed a significant difference between the mean scores of knowledge ($P = 0.008$) and practice ($P \leq 0.001$) in terms of occupation. There was also a significant difference between the means of knowledge scores in terms of educational level ($P \leq 0.001$). However, this test did not show a significant difference between the mean scores of attitude and practice in terms of educational level [Table 4].

DISCUSSION

This study investigated the knowledge, attitude, and practice of people living in Darmian city, South Khorasan, Iran, with regard to MSW management. Knowledge is the knowledge or understanding of society about facts, information, descriptions, or skills related to a topic of interest, which is acquired through experience or education. Attitude is defined as thoughts or feelings about something and referrers to thoughts that are interesting for a society. Practice is knowledge and attitude-based practice, while knowledge and attitude are two determinant factors for the behavior of a society and people.^[8]

According to the results of this study, the mean score of knowledge was 8.53, attitude was 16.60, and practice was 3.02. Safdari *et al.* revealed that knowledge, attitude, and practice of women in this regard was at an acceptable level.^[18] Almasi *et al.* found that the knowledge and attitude of women living in Kermanshah concerning MSW management was 79% and 86%, respectively. However, 77% of them had poor practice.^[19] According to Mahdinejad *et al.*, most people had no or little perception about the recycling of municipal materials.^[20] Babaei *et al.*, showed that their statistical population had a very positive attitude toward participating in waste separation and recycling practices. However, individuals not only had insufficient knowledge about the various stages of waste disposal, but they also had weak practice in these stages.^[8] Based on the results of this study, in most areas, collection of garbage was done from 7 PM to 11 PM (64.2%). In metropolises, the nightly collection of garbage in residential areas may disturb people's sleep and rest due to excessive noise. However, the best time to collect garbage, considering traffic, is between 4:00 AM and 6:00 AM, and it should be ended around 9:00 AM. In addition, based on our findings, most of the participants had average satisfaction with the way of garbage collection. Similarly, Vidanaarachchi *et al.*,^[21] Sujauddin *et al.*,^[22] and Purcell and Magette^[23] revealed that 81%, 49%, and 73% of their participants, respectively, were satisfied with the current garbage collection system. However, our results contradicted with those of Babaei *et al.*, demonstrating that the vast majority of participants were dissatisfied with the collection service.^[8] In a study by Almasi

Table 4: Comparing mean scores of knowledge, attitude, and practice with demographic characteristics of participants

Variable	Mean±SD		
	Knowledge	Attitude	Practice
Gender			
Male	8.61±2.46	16.87±2.87	2.98±1.16
Female	8.39±2.45	16.11±2.31	3.08±1.01
Mann–Whitney U	<i>P</i> =0.57	<i>P</i> =0.04	<i>P</i> =0.85
Marital status			
Single	9.29±2.16	16.47±2.77	2.80±1.34
Married	8.37±2.49	16.62±2.69	3.07±1.05
Mann–Whitney U	<i>P</i> =0.02	<i>P</i> =0.53	<i>P</i> =0.33
Place of residence			
Urban	10.9±2.16	16.53±2.55	3.21±1.05
Rural community	8.18±2.57	16.63±2.80	2.90±1.12
Mann–Whitney U	<i>P</i> ≤0.001	<i>P</i> =0.40	<i>P</i> ≤0.001
Level of education			
Primary school	9.40±2.63	15.36±3.73	2.90±1.34
Secondary school	8.40±2.70	16.35±2.76	3.05±1.01
Sub diploma	7.41±2.07	16.52±2.46	3±1.27
Diploma	8.40±2.26	16.62±2.01	3.05±1.15
Academic	9.63±2.27	17.42±3.12	3.01±0.86
Kruskal–Wallis H	<i>P</i> ≤0.001	<i>P</i> =0.50	<i>P</i> =0.99
Occupation			
Employee	9.57±2.39	16.87±2.94	3.23±0.90
Self-employed	7.91±2.33	16.72±2.68	3±1.11
Worker	8.30±2.50	16.22±2.68	2.83±1.27
Retired	9±1.82	16.20±0.91	2.20±0.42
Unemployed	9.5±2.16	15.16±3.25	2.83±0.40
Kruskal–Wallis H	<i>P</i> =0.008	<i>P</i> =0.51	<i>P</i> ≤0.001

SD: Standard deviation

et al., it was found that women with a university education were less satisfied with garbage collection systems.^[19]

In this study, most people reported morning garbage collection (60%); however, Babaei *et al.*, observed that about 96% of the participants preferred to take the garbage out at the end of the day, and only 3.6% preferred garbage collection in the morning.^[8]

In different stages of waste management, attention to the waste generation stage, as the first stage of waste management, is of great importance. Less waste generation is, in fact, the best and the most environmentally-friendly control method that is anticipated globally in comprehensive waste management plans.^[20] Based on the results of this study, most of the participants performed waste segregation. In Banga's study, 59.4% of the households separated some of their waste. In aforementioned study, families were asked about the separation of solid waste in their homes, 40% considered it as a good idea, while 60% did not do and support it because they found it time-consuming and dirty and believed that it should be done at waste collection places.^[4] The results of this study showed that most of the participants delivered their garbage to itinerant waste-pickers. Therefore, it seems that

promoting public awareness and reforming public attitude and behavior are required. In contrast to our study, Safdari *et al.* showed that most of the participants regularly delivered recyclable waste to garage trucks contracted by municipal service companies.^[18]

Our results showed no significant difference between the mean scores of knowledge and practice in terms of gender; however, female participants had better practice than male ones. We found a significant difference between males and females in terms of attitude; in a way that males got higher attitude scores than. This difference is probably due to the fact that women mostly decide what is useful or waste in families. Banga^[4] and Ekere *et al.*^[24] also found that women did solid waste separation more than men. In line with our study, Safdari *et al.* reported a significant difference between males and females in terms of attitude toward waste separation.^[18] Babaei *et al.* also discovered the effect of gender on participants' knowledge, attitude, and practice.^[8]

With respect to the place of residence, we obtained a significant difference between the mean scores of knowledge and practice. That is, the inhabitants of the city got a higher mean score than rural residents. The fact is that rural households cannot afford waste collection services or do not adhere to the value of waste separation for the environment. They had no reason to separate the waste before its disposal, and they only sorted waste materials that can be sold. The results in the present study revealed a significant difference between the mean scores of knowledge with respect to educational level; however, no significant difference was found between the mean scores of attitude and practice in this regard. Nevertheless, the scores of knowledge and attitude were higher among participants with university education.

Having knowledge about recycling practices affected separating solid waste behavior. Mehdinejad *et al.*,^[20] and Safdari *et al.*,^[18] reported a significant relationship between knowledge and educational level in Iran. Nevertheless, Ekere *et al.* found no relation between educational level and waste separation in Uganda,^[24] which is in line with the present study. However, in Banga's study, those who were at the lowest levels of education performed solid waste separation practice more than those who had higher education.^[4] Babaei *et al.*^[8] and Almasi *et al.*^[19] also revealed that education contributed to the level of knowledge, attitude, and practice.

Our results indicated a significant difference between the mean scores of knowledge and practice in terms of occupation; however, no significant difference between the mean scores of attitude was observed in this regard. Similarly, Safdari *et al.*^[18] reported a significant relationship between the mean scores of knowledge and occupation but insignificant statistical relation between attitude and occupation. In addition, Babaei *et al.* revealed a significant difference between occupation and the level of knowledge, attitude, and practice.^[8]

CONCLUSION

According to the results of the present study, cross-sectoral coordination in the country, in particular, among environmental departments, environmental health departments, and local association seems necessary to promote development and implementation of new waste collection and transportation systems in different rural areas. Educating the community through mass media to reduce waste generation at home and motivate them to collaborate with these plans along with paying special attention to women, as one of the main groups of audience, are also recommended.

One of the limitations of this study, similar to other cross-sectional studies, was doing data collection by questionnaire and self-report method, through which some participants might not have provided real information. Therefore, further studies using more comprehensive approaches and interventional design are suggested.

Acknowledgments

The article was based on a proposal (code: 39.93) provided at the Birjand University of Medical sciences. The authors of the study thank all individuals that helped us sincerely in achieving this study, particularly participants who collaborated in the implementation of the project.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Thakur V, Ramesh A. Healthcare waste management research: A structured analysis and review (2005-2014). *Waste Manag Res* 2015;33:855-70.
2. Tinio MM, Rollon AP, Moya TB. Synergy in the urban solid waste management system in Malolos City, Philippines. *Philipp J Sci* 2019;148:73-97.
3. Ghanadzadeh M, Bolhasani A, Akhavan M, Eshrati B, Shamsi M. A study on the thoughts and viewpoints of people in different professions about solid waste comprehensive management in developing appropriate educational methods. *J Neyshabur Univ Med Sci* 2014;2:9-19.
4. Banga M. Household knowledge, attitudes and practices in solid waste segregation and recycling: The case of urban Kampala. *Zambia Soc Sci J* 2011;2:27-39.
5. Hassan SH, Ahzahar N, Fauzi MA, Eman J. Waste management issues in the Northern Region of Malaysia. *Proc Soc Behav Sci* 2012;42:175-81.
6. Oyeleke S, Istifanus N, Manga S. The effects of hospital solid waste on the receiving environment. *Int J Integr Biol* 2008;3:191-5.
7. Omran A, Mahmood A, Abdul Aziz H, Robinson GM. Investigating

households attitude toward recycling of solid waste in Malaysia: A case study. *Int J Environ Res* 2009;3:275-88.

8. Babaei AA, Alavi N, Goudarzi G, Teymouri P, Ahmadi K, Rafiee M. Household recycling knowledge, attitudes and practices towards solid waste management. *Resour Conserv Recycl* 2015;102:94-100.
9. Sharholy M, Ahmad K, Vaishya RC, Gupta RD. Municipal solid waste characteristics and management in Allahabad, India. *Waste Manag* 2007;27:490-6.
10. Farrelly T, Tucker C. Action research and residential waste minimisation in Palmerston North, New Zealand. *Resour Conserv Recycl* 2014;91:11-26.
11. Koolivand A, Gholami-Borujeni F, Nourmoradi H. Investigation on the characteristics and management of dental waste in Urmia, Iran. *J Mater Cycles Waste Manag* 2015;17:553-9.
12. Karak T, Bhagat R, Bhattacharyya P. Municipal solid waste generation, composition, and management: The world scenario. *Crit Rev Environ Sci Technol* 2013;43:215.
13. Mancini SD, Nogueira AR, Kagohara DA, Schwartzman JA, de Mattos T. Recycling potential of urban solid waste destined for sanitary landfills: The case of Indaiatuba, SP, Brazil. *Waste Manag Res* 2007;25:517-23.
14. Meng X, Tan X, Wang Y, Wen Z, Tao Y, Qian Y. Investigation on decision-making mechanism of residents' household solid waste classification and recycling behaviors. *Resour Conserv Recycl* 2019;140:224-34.
15. Ehrampoush M, Baghiani Mighadam M. Survey of knowledge, attitude and practice of Yazd University of Medical Sciences students about solid wastes disposal and recycling. *Iran J Environ Health Sci Eng* 2005;2:26-30.
16. Byrne S, O'Regan B. Attitudes and actions towards recycling behaviours in the Limerick, Ireland region. *Resour Conserv Recycl* 2014;87:89-96.
17. Sadeh MJ, Jamali Masoomi F, Khamirchi R. Women's awareness and attitude towards recycling the solid waste in sabzevar municipal area 2 in 2010. *J Res Comm Sabzevar Univ Med Sci* 2010;1:9-13.
18. Safdari M, Mirzaei Alavijeh M, Ehrampoush M, Qhaneyan M, Morowatisharifabad M. Knowledge, attitude and performance students of Shahid Sadoughi University of medical sciences-yazd about recycling solid material: A short report. *J Rafsanjan Univ Med Sci* 2013;12:157-64.
19. Almasi A, Mohammadi M, Azizi A, Berizi Z, Shamsi K, Shahbazi A, *et al.* Assessing the knowledge, attitude and practice of the kermanshahi women towards reducing, recycling and reusing of municipal solid waste. *Resour Conserv Recycl* 2019;141:329-38.
20. Mehdinejad MH, Rajaei G, Aryaie M, Ahmadi M, Saeedinia RM. Awareness and performance of people of the cities of Gorgan, Gonbad, and Aliabad Katool (Iran) regarding management of municipal solid waste materials. *J Mazandaran Univ Med Sci* 2013;23:148-53.
21. Vidanaarachchi CK, Yuen ST, Pilapitiya S. Municipal solid waste management in the Southern Province of Sri Lanka: Problems, issues and challenges. *Waste Manag* 2006;26:920-30.
22. Sujauddin M, Huda SM, Hoque AT. Household solid waste characteristics and management in Chittagong, Bangladesh. *Waste Manag* 2008;28:1688-95.
23. Purcell M, Magette WL. Attitudes and behaviour towards waste management in the Dublin, Ireland region. *Waste Manag* 2010;30:1997-2006.
24. Ekere W, Mugisha J, Drake L. Factors influencing waste separation and utilization among households in the Lake Victoria crescent, Uganda. *Waste Manag* 2009;29:3047-51.