How to Cite:
Tariq, M. H., D'Silva, B., & Lala, F. (2022). Awareness and willingness to participate in domestic waste disposal in Mumbai Region. *International Journal of Health Sciences*, *6*(S4), 5163–5173. https://doi.org/10.53730/ijhs.v6nS4.9312

Awareness and willingness to participate in domestic waste disposal in Mumbai Region

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***Abstract*---**Domestic waste disposal is considered to be one the causes of environmental pollution and can be associated to various health problems. Proper waste management and disposal of household waste is a major concern of many people. Research Objective: The objective of this survey was to assess the level of awareness and to identify the willingness to change towards the domestic waste disposal amongst the people. Research Design: An exploratory research was done using a semi-structured questionnaire. Using simple random sampling method, a total of 204 respondents were studied. Data was analyzed using the SPSS software. Findings: In the study 84.8% were aware of the term Domestic waste disposal Management while the rest 15.2 % were not aware at all of the term. Around 51.5% says that they have been given proper education on the domestic waste disposal. About 64.2% responded by saying that are very well aware that domestic waste requires a special treatment before disposal rest of the study population were not familiar with its' proper disposal. Majority of the respondents 51.5% were informed of the various health risks. while 18.1% says they had no idea about the consequences of the health problems and around 30.4% defended by saying not really sure of the impact on health by improper domestic waste disposal management. Almost 96.6% of the study population had an idea about sorting the domestic waste and were aware of its importance. Majority of the respondents, 87.7%, want more education on the domestic waste disposal management. Implications: It is proposed that some awareness programs have to be conducted on safe waste disposal and some efforts have to be taken by the government and the civic bodies to educate the residents on safe domestic waste disposal practices. Limitations: The study was limited to the South Mumbai region.

International Journal of Health Sciences ISSN 2550-6978 E-ISSN 2550-696X © 2022.
Manuscript submitted: 27 March 2022, Manuscript revised: 18 May 2022, Accepted for publication: 9 June 2022

***Keywords*---**awareness, domestic waste disposal, safe disposal, willingness.

Introduction

Mumbai has a coastal stretch of 603 sq. km; geographically the city of Mumbai can be divided into 3 sections which are known for administrative purpose as Division 1, Division 2, and Division 3 respectively. The total population of the city amounts nearly 13 million that is increasing on a daily basis. Mumbai generates waste of approximately 7,025 tons per day. The bio-degradable waste which is the wet waste consists of fruit and vegetable remainders, spoiled food, egg shells. Recycle which is the dry waste consists of newspaper, thermocol sheets, plastics, battery cells, iron sheets and glass.

The Municipal Corporation of Greater Mumbai is actually responsible for the management and disposal of waste in the city. The garbage is collected by the municipal authorities and then disposed of at three main dumping sites. The housing societies collect the waste generated by the household and dump it in the dustbin. In the South Mumbai the trucks collect garbage from the various bins and then transport to a particular transfer station which is located in Mahalakshmi. For transferring the garbage from Mahalakshmi a separate transport is arranged in many parts of northern part of Mumbai. So in this way majorly 95% waste which is generated in the city is disposed of. One of the crisis which can arise is the dumping grounds are nearly 30-40 km from South Mumbai which has a huge cost on the transportation facility. The huge population in the city has forced many of the people to shift near the dumping grounds which have led people to stay in unhealthy conditions and thus expose them to various health hazards.

Literature Review

Hu, S., & He, J. (2022). The survey was conducted in the rural areas of China with an aim to understand the willingness of the rural respondents of China to engage into household waste disposal practices. The results of the survey indicate that there is significant positive correlation between residents' willingness to classify and their willingness to put their waste in a designated place. It was concluded that the level of education, income and the environmental awareness of the rural residents of China have a significant positive impact on waste disposal willingness. Hu, J., Tang, K., Qian, X., Sun, F., & Zhou, W. (2021). The research was to understand the factors behind the behavioral change in waste separation in the community. The findings implied that policies targeting environmental education are effective to help the residents for more positive intentions towards the waste disposal and separation. Pierini et al. (2021) concluded that there is high willingness to incorporate sorting and composting habits among those who are not currently engaged in the practice of segregation and disposal of household waste management.

Miner et al (2020) established that there is no significant correlation between existing awareness levels on e-waste and willingness to participate in the

management. It was interesting to note that more than 67% of the respondents were aware about household e-waste disposal, although, almost 68% of them were not educated in detail about the methods of e-waste disposal and management. The survey also deduced that majority of the respondents were willing to pay a token amount in order for proper e-waste disposal and management. About 90% of the respondents were willing to learn more about proper e-waste disposal.

Kaithery, N. N., & Karunakaran, U. (2019) concluded that majority of the participants had an average attitude towards household waste management. The awareness programs have to be conducted on safe waste disposal and efforts should be made to sustain the supervision of household management. Mukama et al (2016) conducted a survey in two urban slums of Kikulu and Kikooza, in Central Uganda and it was established that practice in waste disposal and separation were poor despite high willingness to participate to improve waste management. This highlighted the need for authorities to engage residents of slums to improve waste management. Mamady, K. (2016) conducted a study for household waste management in Guinea and it was deduced that the community residents have immense knowledge of the harmful effect of poor waste management but have very little idea of the implication of waste in the environmental contamination and transmission. Mukherji et al (2016) conducted an exploratory survey in Delhi with an objective to understand the situation in Delhi with respect to segregation, storage, collection and disposal of household waste and it was established that there is a significant willingness amongst respondents to engage in household waste management.

Mutungwe et al (2014), conducted a study in Chinhoyi urban, Zimbabwe with an aim to study the awareness and practice of solid waste management. The study established that Chinhoyi residents were aware of the danger of improper waste management; they also had an understanding of the need to have a proper and a safe waste management system. Yoada et al (2014) carried out a survey in Urban Accra. The study showed that 61% of the household disposed their waste at community bins and the remaining 39% disposed their waste in gutters, streets holes. About 83% of the respondents were aware that improper waste management contributes to various disease. There was a general perception that children should also be responsible for transporting waste from their household to the dumping sites. Otitoju, T. A., & Seng, L. (2014) conducted a survey in Kuching South city Sarawak, Malaysia. The finding of the study implies that the ease of access to facilities and method of collection are the major limiting factors preventing household from waste segregation in Kuching South city, Malaysia.

Kumar, M., & Nandini, N. (2013) carried out a research in Bangalore with a study on community attitude, perception and willingness towards the solid waste management. The study indicates that 63% of household are willing to participate for a better management, 97.8% of household prefer daily collection and 82.5% of the household are comfortable to segregate their waste into different bins. Licy et al (2013) conducted a study in Kerala with an aim to obtain information about the waste management practice among the school children in Kerala. The findings reveal that there were serious drawbacks in the practice of proper waste management amongst the higher secondary school students as compared to high

school students which may be due to insufficient motivation from parents and the teachers at this stage.

Desa et al (2011) conducted a research in Malaysia with the aim to assess the knowledge, attitude, awareness status and behavior concerning solid waste management amongst the first year students. The results of the survey showed that more than half of the students (65.9%) have negative attitude towards the solid waste management. It was concluded that there is no relation between education and attitude towards the environment. Ku et al (2009) carried out in Korea with an attempt to apply choice experiments with regard to the residential waste disposal system. It was concluded that frequency of waste collection is not a significant factor in the choice of the improved waste management program in Korea.

Purpose of the study

The main purpose of this research is to understand the level of awareness the respondents have towards the domestic waste management and disposal. This study aims to understand if there is any kind of education and awareness amongst the people. Secondly it also wants to find out if the respondents are aware of the proper method of disposal of the domestic waste. It is important to make people realize the seriousness about the proper disposal method of domestic waste. Uncollected waste can cause health hazards as well as pollute the environment, thus causing life-threatening diseases.

Theoretical foundation

This research has its foundation in the Social learning theory. This theory was proposed by Albert Bandura and it suggests that the social behavior is something which is learned by way of observing and by imitating the behavior of other individuals. Many scholars are using social learning models which address complex individuals in the best possible way. Waste Management is of the best examples of complex challenges our society needs to look into. Social learning theories adopt a general view which focuses on the interaction between the individuals and the environment. (Muro & Jeffrey, 2008)

Examples of problem solving dimension using social learning as means to support participatory planning in integrated water management (e.g. Pahl-Wostl et al., 2008), forest management, impact assessment (e.g. Webler et al. 1995; Saarikoski, 2000), conservation planning and management, and participatory rural research (e.g., Rist et al. 2007) (Muro & Jeffrey, 2008).

Research objectives

1. To assess the level of Domestic waste disposal amongst the people.
2. To identify the willingness to change towards domestic waste disposal amongst the people.

Hypotheses statements

H1: There is no significant difference in the level of awareness of the respondents based on age.
H2: There is no significant difference in the level of awareness of the respondents based on gender.
H3: There is no significant difference in the level of awareness of the respondents based on educational qualification.
H4: There is no significant difference in the level of awareness of the respondents based on marital status.
H5: There is no significant difference in the level of willingness of the respondents based on age.
H6: There is no significant difference in the level of willingness of the respondents based on gender.
H7: There is no significant difference in the level of willingness of the respondents based on educational qualification.
H8: There is no significant difference in the level of willingness of the respondents based on marital status.

Research methodology

This research follows an exploratory research design. The survey method of data collection was used to gather data from the respondents using google forms. The responses were analyzed using quantitative research methods. The sample was chosen by simple random sampling method.

Sample size: Through the questionnaire, a healthy sample size of 204 respondents participated in the survey which included Males, Females and children of all ages in the city of Mumbai.

Data analysis and findings

Table 1 summarizes the demographic data of the respondents. Out of the 204 respondents, 54.4% (n=111) were men while 45.5% (n=93) were women. The highest percentage 53.9% (n=110) of the respondents were in the 21-30 age category whereas the individuals aged 41-50 were less represented 9.8% (n=20). Most of the respondents were in the graduation & above category 80.9% (n=165), while fewer of the respondents had no basic education at all 2% (n=4) or had just completed primary schooling, 5.9% (n=12). In terms of the marital status most of the respondents were single individuals, 66.2% (n=135), while 33.8% (n=69) of the respondents were married.

Table 1: Demographic profile of the respondents (n=204)

Variable	Category	Frequency (f)	Percentage (%)
Gender	Male	111	54.4%
	Female	93	45.5%
Age	Under 20 years	25	12.3%

	21-30	110	53.9%
	31-40	22	10.8%
	41-50	20	9.8%
	51&above	26	12.7%
Education Qualification	No formal education	4	2%
	Primary education	12	5.9%
	SSC	7	3.4%
	HSC	16	7.8%
	Graduation& above	165	80.9%
Marital status	Married	69	33.8%
	Unmarried	135	66.2%

Table 2 indicates the results from the analysis of variance (ANOVA) for assessing the relationship between respondents' awareness of domestic waste disposal and willingness to participate in domestic waste management on basis of their education and age.

On the basis of education, there is no significant difference in the level of awareness (p = .090) and willingness (p = .125) amongst the respondents. Hence, we accept H3 & H7.

On the basis of age, there is significant difference in the level of awareness amongst the respondents. (p=.007 it is significant at .05 level of significance). Hence, we reject H1.

On the basis of age there is no significant difference in the level of willingness amongst the respondents. (p = .121). Hence, we accept H5.

Table 2: ANOVA test on awareness and willingness to participate in domestic waste management according to the education and age

		Sum of Squares	df	Mean Square	F	Sig.
Educational Qualification						
Awareness	Between Groups	.798	4	.199	2.040	.090 ns
	Within Groups	19.454	199	.098		
	Total	20.252	203			
Willingness	Between Groups	.776	4	.194	1.826	.125 ns
	Within Groups	21.160	199	.106		
	Total	21.936	203			
Age						
Awareness	Between Groups	1.367	4	.342	3.603	.007 s
	Within Groups	18.884	199	.095		
	Total	20.252	203			
Willingness	Between Groups	.786	4	.196	1.848	.121 ns

	Within Groups	21.151	199	.106		
	Total	21.936	203			

From table 3, we can infer that since *p = .004* is less than our chosen significance level (0.05) there is significant difference in the level of awareness amongst the respondents on the basis of marital status. Hence, we reject H4.
Furthermore, p = .065 is greater than our chosen level of significance (.05), there is no significant difference in the level of willingness of the respondents on the basis of their marital status. Hence, we accept H8.

Table 3: Independent Samples Test (Marital Status)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Awareness	Equal variances assumed	.887	.347	2.909	202	.004	.13353	.04591	.04301	.22404
	Equal variances not assumed			3.036	154.060	.003	.13353	.04398	.04664	.22041
Willingness	Equal variances assumed	16.611	.000	-2.062	202	.040	-.100	.048	-.195	-.004
	Equal variances not assumed			-1.863	105.595	.065	-.100	.053	-.205	.006

From table 4, we can deduce that there is no significant difference on the level of awareness (p = .323) and willingness (p = .274) of the respondents on the basis of gender. Hence, we accept H2 & H6.

Table 4: Independent Samples Test (Gender)

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper

Awareness	Equal variances assumed	.093	.760	.991	202	.323	.04400	.04440	-.04355	.13155
	Equal variances not assumed			.992	196.296	.323	.04400	.04437	-.04351	.13151
Willingness	Equal variances assumed	5.001	.026	-1.114	202	.267	-.051	.046	-.143	.040
	Equal variances not assumed			-1.096	179.595	.274	-.051	.047	-.144	.041

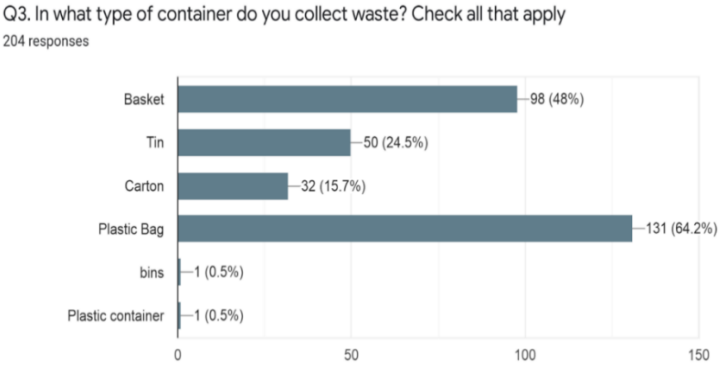
From table 5, we can infer that many of the respondents are aware of the health problems which are associated with the domestic waste disposal (51.5%) and hence about (96.6%) know that sorting domestic waste is important towards improving the waste management. By comparison, such relatively higher awareness levels on domestic waste amongst the respondents have also been reported by another study conducted in Urban Accra. In the present study only (64.2%) are educated that domestic waste requires a special treatment before its disposal.

Table 5: Statements Estimating Awareness and Knowledge of Domestic waste among respondents (n=204)

Statements Estimating Domestic waste Awareness and Knowledge	Yes (%)	No (%)
Q1. Have you heard about Domestic waste disposal Management?	173 (84.8%)	31 (15.2%)
Q2. Have you ever been educated on proper Domestic waste disposal?	105 (51.5%)	99 (48.5%)
Q3. Do you know that Domestic waste requires special treatment before disposal?	131 (64.2%)	73 (35.8%)
Q4. Are you aware of the health risks associated with the domestic waste?	105 (51.5%)	37 (18.1%)
Q5. Do you think sorting Domestic waste is important towards improving waste management?	197 (96.6%)	7 (3.4%)

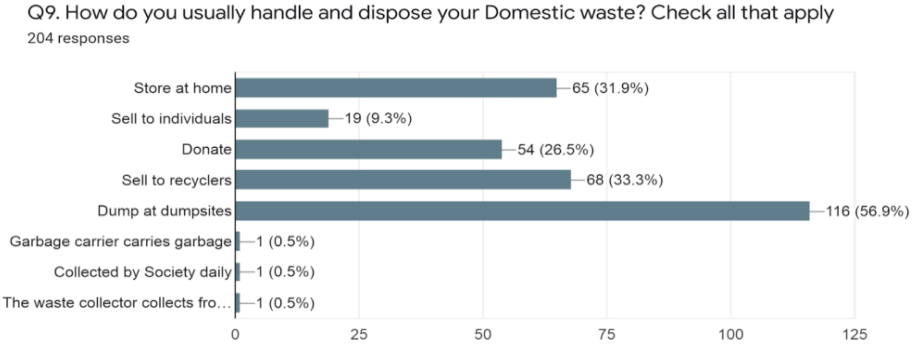
Graph 1 demonstrates the type of container used for collection of daily domestic waste. To a great extent about (64.2%) disposed their domestic waste in the plastic bags and (48%) used baskets to collect their waste.

Graph 1: Type of container used for collection of daily domestic waste



Graph 2 illustrates the various methods of handling and discarding domestic waste and it was found that around (56.9%) dump their waste at the dumpsites and most of them (31.9%) simply store it at their home. However, some of the domestic waste is sold to recyclers (33.3%) or is donated (26.5%) to people who need it.

Graph 2: Methods of handling and discarding domestic waste



Discussion

Previous studies have demonstrated that there was no significant correlation between existing awareness on e-waste (Miner, K. J., Rampedi, I. T., Ifegbesan, A. P., & Machete, F. (2020). Around 67% of the respondents were aware about household e-waste disposal but 68% of them were not educated about the methods of e-waste disposal. Similarly, the results of this study highlight that a huge 64.2% are very well aware of the domestic waste management while most of the respondents stated they would want more education on the proper methods of domestic waste disposal.

Some of the related studies also revealed a positive attitude towards the household waste disposal but awareness programs have to be conducted on safe waste disposal and to sustain the supervision of household waste management (Kaithery 2019**)**. Similar to these findings the current study pointed that the respondents need to be addressed and given proper education on household

waste management. Mukama, T. et al. (2016) deduced that poor solid waste management was one of the biggest challenges faced by the slum people of Central Uganda, also it was difficult to understand the community's concerns and willingness towards the improvement of waste disposal and separation. The findings of this research are comparable to the current study.

Scope and limitations of the study

The scope of the survey is limited to the urban city of Mumbai and aims at only finding the level of awareness of the respondents. The findings cannot be generalized to other tier 2 and tier 3 cities. Although, the findings of this research can serve as a background towards implementing awareness programs and initiatives by the government or civic bodies.

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