

Plastic waste management: case study of tower market, Hyderabad

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Received: 01 December 2020, Accepted: 24 March 2023, Published: 01 April 2023

KEY WORDS

Plastic Waste Management
Tower Market
Unhygienic Environment
SPSS Software

ABSTRACT

Plastic consumption is continuously increasing due to urbanization and growing global demand. The consumption of plastic deteriorates the quality of the urban environment of most cities, especially in developing countries. To overcome this issue to some extent, this study was conducted to prevent the usage of plastic products to provide a healthy environment. The data was collected by using the closed-ended questionnaire survey and by reviewing the literature. The collected data were assessed and analyzed on SPSS (Statistical Package for Social Sciences) software. The survey observed that there is no proper plastic waste disposal system in the study area. People who reside in the area and those who visit the market face an unhygienic environment. The results highlighted that 50% to 60% of residents use plastic items which are dumped at open spaces without proper management after their consumption. This study suggests short-term, mid-term and long-term mitigation measures to reduce the production by using bio-based plastic and consumption by reducing the unnecessary packaging of plastic waste.

1. Introduction And Research Background

Plastic is the global term for a broad spectrum of strong natural materials produced or semi-engineered [1, 2]. Plastic utilization is expanding because of urbanization and the developing worldwide interest [3]. The most common plastics found in the oceans are polyethylene, and polypropylene, and which they counted as the most manufactured plastics in the world [4]. A polymer may contain different added substances like plasticizers, stabilizers, emollient, UV engrossing materials, and fire retardants to improve execution Almost the surface of human life has filled with plastic, for example, bundling, horticulture, water transportation, building development, media transmission, instruction, medication, transportation, safeguard, purchaser durables. [5, 6]. With the passage of time, financial

growth, changing use, and production designs are rapidly expanding [7]. Environment, economic and ecological losses are the main causes of a very large amount of plastic waste [8]. Around 50% of plastic is utilized for single-utilized dispensable applications, for example, bundling, and expendable buyer things [9]. The principle arrangement of waste disposal in most non-industrial nations, arranged by strength, is food squandering, trailed by paper squandering followed by plastic waste [10]. An enormous amount of plastic waste holes into the climate that is causing significant monetary and biological harm[11, 12]. India has witnessed a critical development in the production of plastics and increased use of plastic [13]. In the age of plastic waste on the earth, financial development and changing designs for use and production are

increasingly expanding. Worldwide manufacture of plastics touched 322 million metric tons in 2016 (39.9% in EU) being operated in packaging [14, 15]. Management of plastic wastes is one of the basic issues because about 300 million metric tons per year of plastic is produced and half of this volume is thrown in open environment [5]. Therefore, the chemical attention gradients are often not steep sufficient to permit for large net transfers of chemical substances from plastic to the tissues [16-18]. Only nine percent of the nine billion tons of plastic that the world has ever supplied has been reused. Most of them wind up in landfills, dumps, or in the environment. On the off chance that current examples of utilization and rehearsal of waste organization continue, 12 billion tons of plastic litter in landfills and the environment will be cycled by the end of 2050 [19]. If the blast in plastic assembly continues at its current rate, the plastics venture may also account for 20 percent of the entire oil utilization of the world at that point. In 2007, the world's creation of plastics rose to around 260 million tons. In Europe, this brought about the age of 24.6 million tons of post-shopper plastic waste centered in the bundling, development, vehicles, and electrical and electronic devices areas. Half of this waste was discarded in landfills, even as 20% used to be reused and 30% used to be recouped as quality [20]. Pakistan is facing an energy emergency on one hand and trouble in moving squanders from age to conclusive removal because of a quickly expanding population [21, 22].

This research focuses on the problem of plastic waste management in Tower Market of Hyderabad City. The financial turn of events and individuals' changing the examples of utilization and creation have prompted a serious expansion in plastic squanders in Hyderabad. However, plastic garbage removal hurts the climate and their stances danger to human wellbeing. There is no proper solution to recycle all the plastic material because it is very hard to recycle it. So, awareness about the hazardous effects of plastic is very necessary. This research study does not only highlight the existing condition of plastic waste management, but it will also be helpful for the concerned authorities to manage the plastic waste properly in study area. Adaptation of short-, medium-, and long-term measures in this research will be helpful to make sustainable urban environment.

1.1. Study Area

The Tower Market of Hyderabad as shown in Fig. 1, was selected as a case study area to conduct this research.

Hyderabad is the second-largest city in the province of Sindh [23] with the population of 21,99,928 and the population of Hyderabad Taluka which includes the area of Tower Market is 275,153 [24]. The purpose of selecting this site was to identify the problems of people which are being faced by them due to improper plastic waste management.

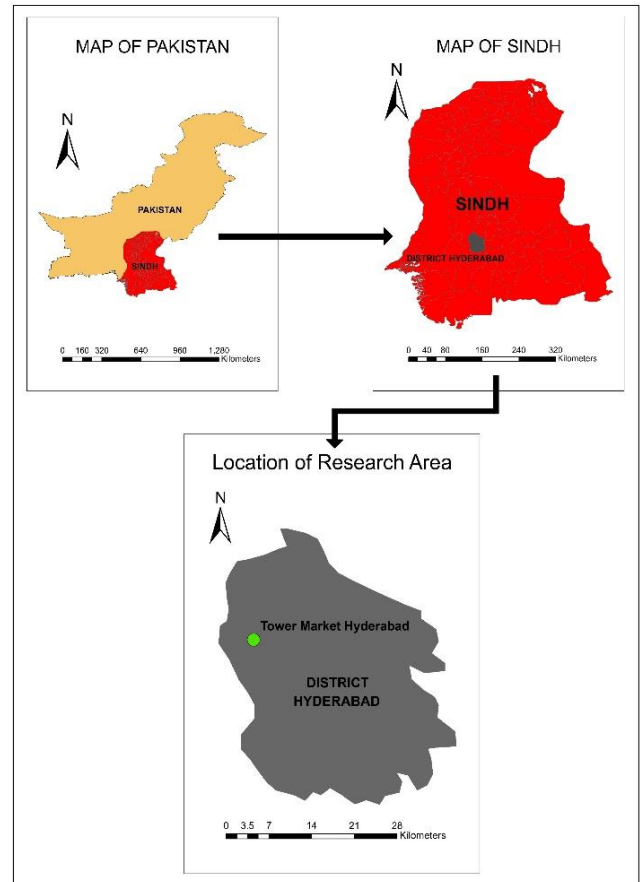


Fig. 1. Study area (source: researcher)

2. Material And Methods

In this research, two types of data were collected through a closed-ended questionnaire survey and by reviewing research papers. The aim was to identify the causes of plastic waste disposal in the Tower Market, Hyderabad, and their effects on human life. The sample for the closed-ended questionnaire survey was selected by using a random sampling technique. Total 384 questionnaires were filled from the respondents of the tower market based on the De-Morgan [25] Table 1. Where it has been suggested that for 75,000-1000000 population the sample size should be 384. Although the population of Hyderabad Taluka includes the area of Tower Market is 466,770 as per 2017 enumeration. So, the sample of 384 questionnaires is acceptable for the

study. While the data collected from shops owners, residents, and travellers of the area to get their opinion regarding plastic consumption and final disposal of plastic waste.

Table 1

De-Morgan table for sampling [26]

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note: N is the population size, and S is the sample size

After the collection of data, it was analyzed by using descriptive statistics. The descriptive statistics included frequencies in tables, and then the results were prepared in the form of percentages and frequencies. The researchers used percentages for interpreting the results of the study. The Statistical Package for Social Sciences (SPSS) program was used for data the analyses. The flow chart of the research methodology is represented in Fig. 2.

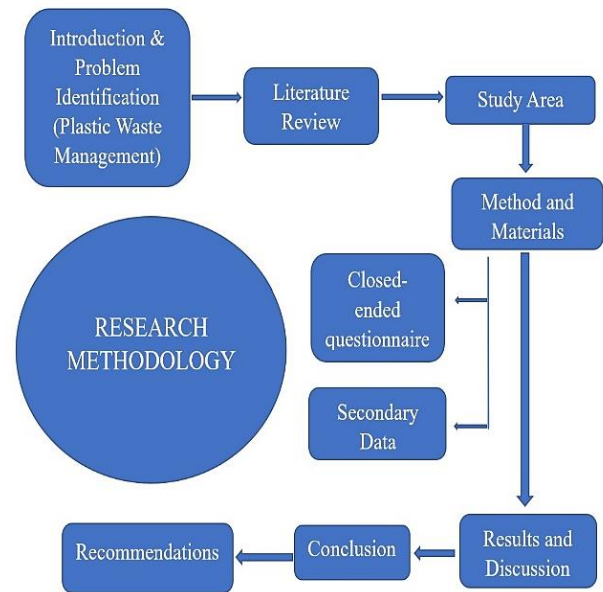


Fig. 2. Research methodology flow chart (source: researcher)

3. Results And Discussion

Fig. 3 shows the age of respondents in which results revealed that 13% people were under 20 years old, 42% people were 21-30 years old, 15% were 31-40 years old and rest of the 30% were above 40 years old.

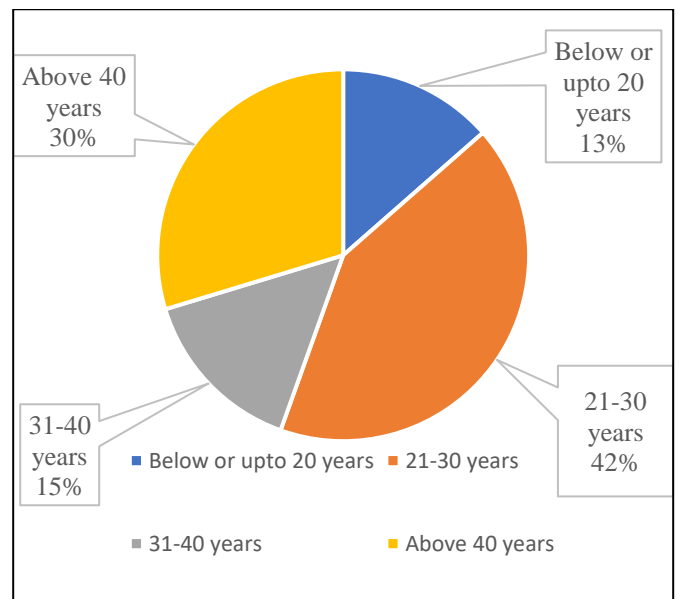


Fig. 3. Age-wise classification of residents

Table 2 shows the living interval of people who are residing in the study area. According to Table 1, 32% were those who settled in between 1-5 years, 20% were living for 5-10 years, 20% were living for 10-15 years and 28% were those who were living more than 15 years in the study area.

Table 2

Living interval of people

Time Period	Frequency	Percent
1-5 years	123	32.04
5-10 years	77	20.05
10-15 years	77	20.05
More than 15 years	107	27.86

Fig. 4 indicates the usage of plastic bags in the study area. From Fig. 4, it has been found that 50% were those who always use plastic bags, 40% were those who use sometimes and 10% were those who use plastic bags occasionally. It means the majority of the population is using plastic bags, which they openly throw on roads. As a result of these streets and roads are not cleaned so that anyone can move easily. This creates an unhygienic environment for the citizens.

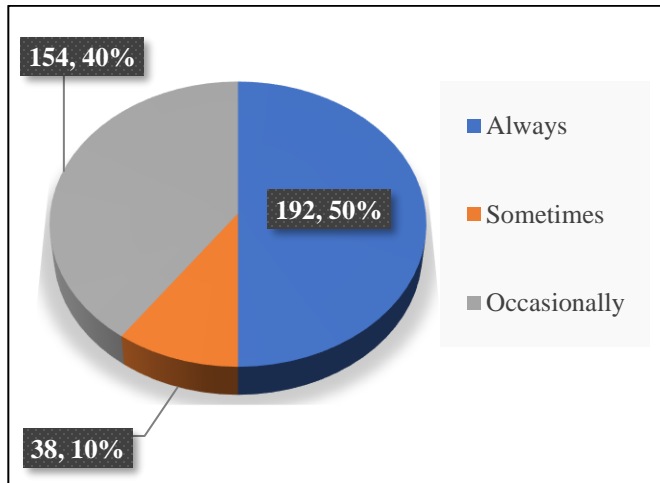
**Fig. 4.** The usage of plastic bags

Fig. 5 showed that 53% of people used plastic bags while 26% people used plastic liquid containers and 21% used plastic bucket and bins. The use of plastic bags is very common in the study area because it is commercial as well as residential area. People not only come here to shop but also most of them reside here. This huge quantity of plastic waste is neither collected nor managed properly.

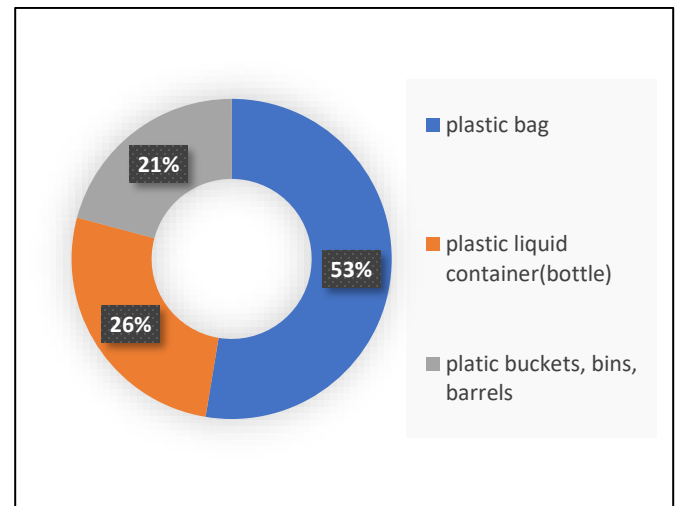
**Fig. 5.** The usage of plastic products

Table 3 explains the availability of dustbins in the research area which highlights that 52% of people disagreed with the availability and 16% were those who agreed and 32% were those who mentioned that dust bins are available in some specific areas. However, this less availability and unavailability of dustbins enforcing people to dump the waste openly which creates an unhealthy environment.

Table 3

Availability of dustbins

Status	Frequency	Percent
Yes	62	16.15
No	198	51.56
At some specific areas	124	32.29

Table 4 explains that 10% of respondents said that there are metal bins used in the study area, 51% said plastic bins, 17% said that oil drums and 22% of respondents said that there is another type of storage bin used in the area.

Table 4

Types of bins for waste storage

Types	Frequency	Percent
Metal bin	38	10
Plastic bin	196	51
Oil drums	67	17.44
Others	83	21.56

According to Fig. 6, 57% of people realized that plastic waste affect the environment as well as human health. 26% were those who think plastic waste affect only humans and 17% people think it just affect the environment, but not humans.

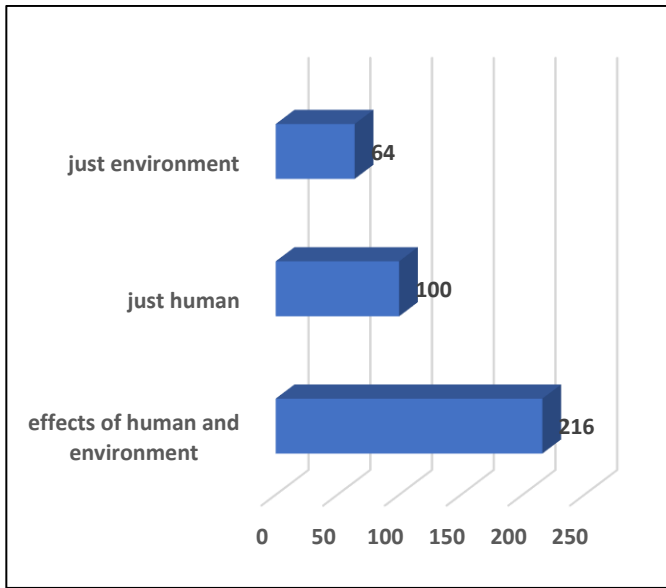


Fig. 6. Effects of plastic waste

The purchasing quantity of plastic bottles per week in the area is shown in Fig. 7. According to Fig. 7, 44% were those who buy (1-5) plastic bottles per week, 24% buy 05-10 plastic bottles, 16% discount 10-15 bottles, and 16% buy more than 15 plastic bottles per week.

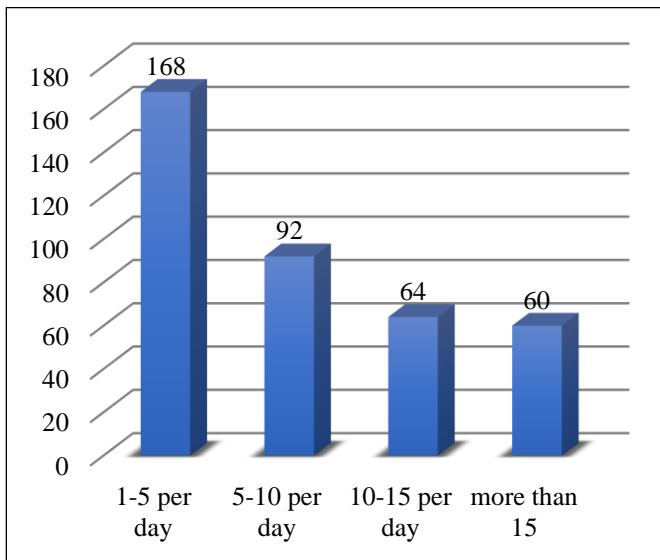


Fig. 7. Purchasing of plastic bottles

72% of plastic bags were obtained by people through buying from shops for their own use, 23% were obtained from shopping malls and 5% were obtained during wedding occasions as mentioned in Fig. 8.

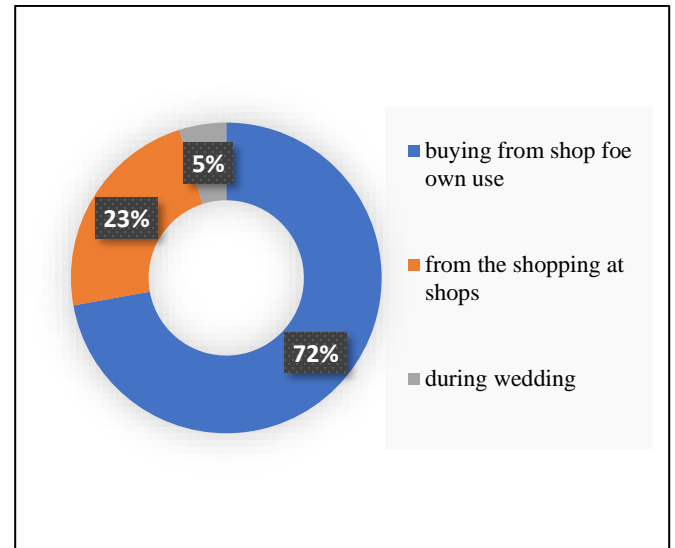


Fig. 8. Purpose of buying shopper bags

Table 5 shows which things respondents carried in plastic bags; it further clarifies that 47% of people carried plastic bags for food and on the other side 29% of respondents carried plastic bags for clothes and 24% carried for other purposes.

Table 5

Things carried out in plastic bags

Things	Frequency	Percent
Foods	182	47.40
Clothes	109	28.39
Other	93	24.21

60% of respondents recognized that plastic waste is collected daily. 17% of persons said that plastic waste was collected once a week, 12% of people stated more than once a week and 10% of respondents reflect that waste was collected in monthly as given in Table 6.

Table 6

Collection of plastic waste

Parameters	Frequency	Percent
Daily	231	60.15
Once a week	65	17
More than once a week	49	12.70
Monthly	39	10.15

Table 7 clarifies the role of the municipality in the avoidance of plastic bags. The results revealed that 42% of respondents agreed that the city is doing enough regarding the avoidance of using plastic bags and 59% disagreed with this statement Table 7. It means the municipality is not working properly to reduce the usage of plastic bags.

Table 7

Role of municipality		
Remarks	Frequency	Percent
Yes, they are doing enough	162	42.19
No, they are not doing enough	222	57.81

52% respondents were aware about the government’s policy regarding plastic waste and 48% were unaware about the policy as mentioned in Fig. 8.

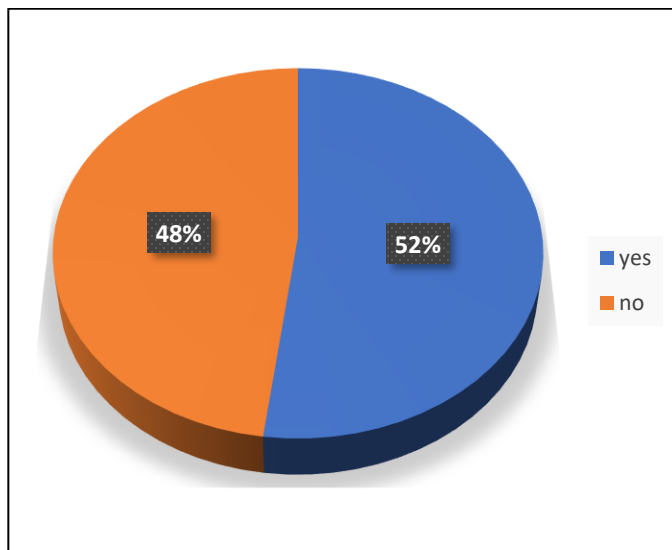


Fig. 8. Awareness of policies

Fig. 9 explains that 29% of respondents were willing to pay for plastic waste services, and 71% were not willing to pay for services. As a result, these people were not provided with enough facilities to remove or control plastic waste in the study area.

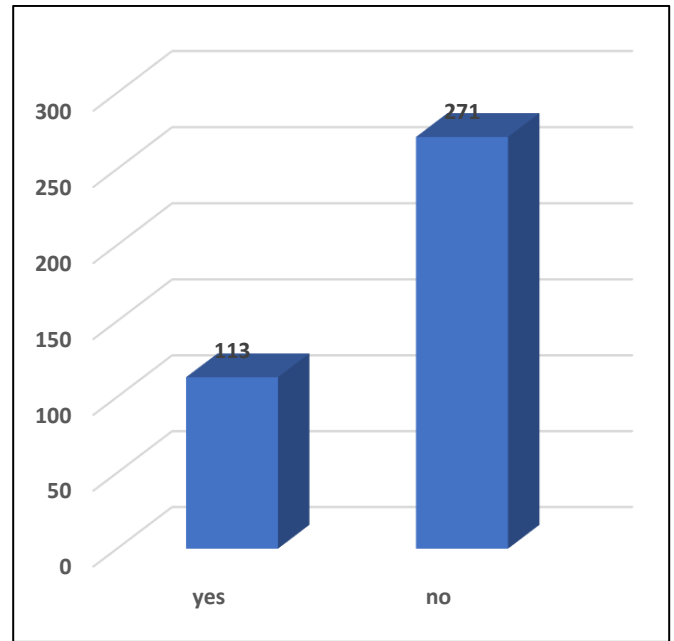


Fig. 9. Willing to pay for waste services

Table 8 defines that 17% of people dispose of their own generated plastic waste at backyard dug of pit while 70% dispose in dump outside the yard and 13% dispose of plastic waste at other specific areas. Very few people are there who dispose of the waste on particular areas.

Table 8

Disposal of own-generated plastic waste		
Parameters	Frequency	Percent
Backyard dug of pit	67	17.44
Dumped outside the yard	268	69.80
other	49	12.76

The results regarding the payment of waste management services recorded as 14% of people were those who did not pay for waste management services, 18% of respondents were paying 50-100 rupees/month, 51% were paying 100-200% Rs/month and 17% people paying more than 200 Rs/month for waste management services as illustrated in Fig. 10. As a result of these municipalities and authorities are not providing adequate services.

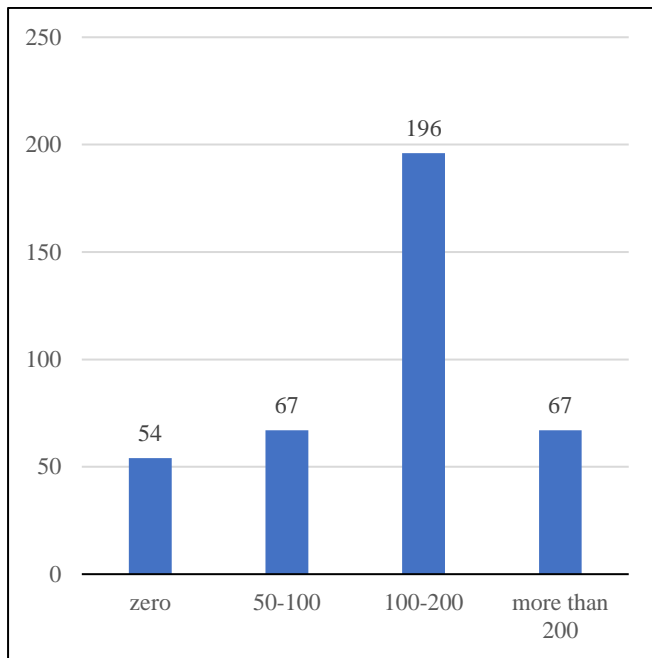


Fig. 10. Payment of waste management services

Fig. 11 reports that 45% of respondents agreed with the availability of plastic waste management services, 32% denied that there is no available any type of waste management services but 23% also agreed that waste management services available sometimes.

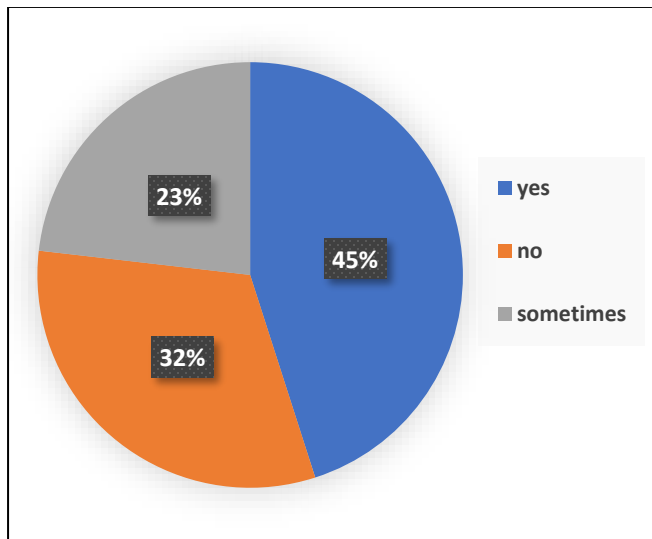


Fig. 11. Availability of waste management services

4. Conclusion

The study's aims were to identify the existing plastic waste management system and to suggest remedies to reduce the use of plastic products to create a healthy and clean environment for people. To achieve the desired results, the primary and secondary data were collected through closed-ended questionnaire survey and by reviewing the previous studies respectively. From the findings of the study, it has been concluded that people who are living and visiting the tower market in

Hyderabad are facing various problems related to plastic waste management. Results show that about 50-60% of people use plastic bags daily because most of the things they purchase are given in plastic bags. Whereas there are very few areas where dustbins are available due to which people discarded plastic bags openly. This improper disposal creates pollution and an unhygienic environment in the area. There are many people in the study area who did not pay service charges and 51% responds pay about 100-200 rupees monthly for the availability of services. During the field survey it has been observed that the physical condition of the area is not good and environment friendly for sustainable urban life.

5. Recommendations

The research aim has been achieved where the study has suggested some short-term, medium-term, and long-term measures by reviewing the research papers. These measures are very useful to improve the existing condition of not only the study area but also all the developing cities which are facing a similar issue of unplanned plastic waste management. Measures for improvement are as follows:

5.1 Short-Term Measures

- There should be proper instruction that can reduce or ban the utilization of those materials that are harmful to the environment.
- By making the artificial materials expensive and by marking, mindfulness, training, and by giving eco-accommodating options in contrast to flexible materials utilization of artificial materials can be minimized.

5.2 Medium-Term Measures

- Prioritizing reusing tracked by waste-to-energy and feedstock that permits the recuperation of important synthetics and energy. The landfill should just be utilized in squander created in the past cycles.
- Minimization and reusing of unwanted frames during creation and duty over waste and effects brought about results.

5.3 Long-Term Measures

- Encourage the usage of a renewable source of power during waste processing and reuse to reduce the ecological impact of reused plastics.
- Implementation of LCA (Life cycle assessment) for each object and cycle to enhance the eco-

plan (reuse, repair, and recyclability counting), given the planned end-of -life of items.

- Using bio-built pliable to minimize the ecological impact of fuel-based plastics; reducing the development of degradable plastics that contain hazardous parts (miniature plastics); using biodegradable plastics in applications where soil fertilization is advantageous (e.g. farming films) while providing explicit assortment and waste disposal (since biodegradation may be slower or unrealistic).

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