

A Study on Existing Mechanism of Municipal Solid Waste Management in Dadu City

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Abstract

This research aims to evaluate the problems of municipal solid waste management in Dadu city, Sindh, Pakistan. In this research, environmental and human health impacts were also examined. Data was collected by using closed-ended questionnaires, interviews from officials, and field observation. The sampling was done through the stratified random method. The gathered data through closed-ended questionnaires was analyzed in the statistical package for social sciences (SPSS). Results revealed that the amount of municipal solid waste generated by inhabitants in the premises of the municipality of Dadu city was around 1029 tons/day on average. The survey outcomes reveal that there are serious issues with the management of the municipal waste and arrangements were faulty and inadequate for the quantity generated daily. The municipal wastes are dumped in open un-managed dumped sites, which are not recognized to date. It is also found that the inhabitants nearer to the dumpsites are being affected by different diseases. It has been concluded that the shortage in the present municipal solid waste management performances was mostly connected to the action of the municipality and residents. These outcomes call for the immediate need for an effective mechanism, which includes among other things such as the increased quantity of vehicles that can manage the municipal solid waste properly throughout the city.

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Keywords: Municipal Solid Waste, Human Health, Waste Generation, SPSS, Dadu City.

1. Introduction

During the period of last five decades, cities with low-income countries around the globe, have witnessed huge migration. With the increase in population, migration, industrialization, and economic development in the world, the problems of management of Municipal solid waste also increased [1]. Solid waste can be segregated into two wide categories, i.e. Municipal solid waste and industrial solid waste [2]. Therefore, it was felt that this research study will focus on municipal solid waste, produced by inhabitants (households) [3]. Management of municipal solid waste is mostly complex nowadays due to the ever-increasing magnitude of waste [4]. Large-scale waste generation has resulted in the creation of many waste management operations (e.g., collection, transportation, treatment, and elimination) [5]. The conditions of budget share for the municipal share are pathetic so far budget share is concerned also in remote countryside areas, there is no proper method for collection of waste [6]. The management and disposal of municipal solid waste are the biggest challenges to secondary cities of Pakistan [7]. One can witness huge dumpings on the curbsides of these secondary cities, which poses a serious threat from disease to the inhabitants [8]. The generation of municipal solid waste of Pakistan in 2017 will be around 91,018 tons per day [9]. It will be a daunting task for the municipal administrations to manage and dispose of it properly, being its primary responsibility [10]. This research study is expected to identify and highlight the problems of municipal solid waste management in Dadu city. This research is also essential in the sense that it is useful for concerned authorities and as well researchers to provide models and management system for municipal solid waste in the research area to maintain fresh and healthy environment.

1.1. Study Area

Dadu city was selected as a case study area for this research. It can be considered as a fast-growing and developing city and district headquarter of the Dadu district. The area of Dadu City is about 10000 acres approx., covered with both developed and underdeveloped areas. The base map of Dadu city is given in the below Figure (Fig. 1). Taluka Dadu is administratively divided into four union councils. The particular emphasis was paid on Dadu City through research by

considering time limitations and other resources, so that study could be completed proficiently. This research aimed at identifying municipal waste generation, problems of disposal of municipal solid waste in Dadu city by considering time and budget.

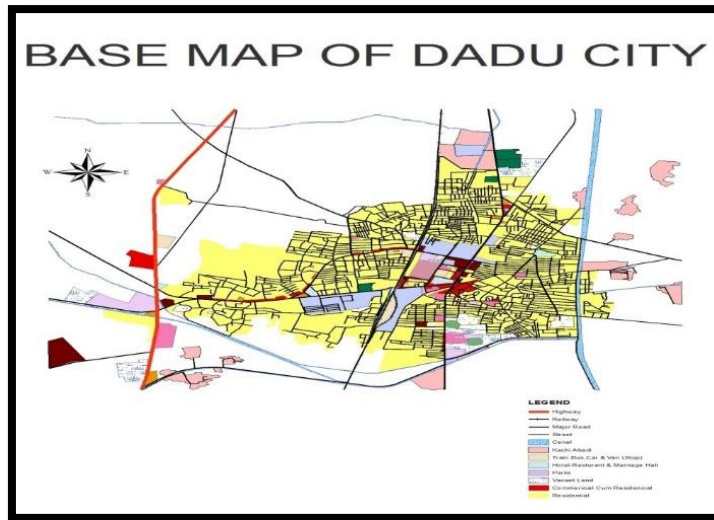


Fig. 1: Location map of Dadu City

2. Methods for data collection

There are multiple methods for data collection but for this research, a field questionnaire survey was selected [11]. To get data, the household survey was conducted throughout the day timings. Moreover, to make survey records successful, a meeting with municipal officials was held. Besides that, field observations were collected to get the data about municipality, production, municipal solid waste management, and the exiting Municipal solid waste management system. To find out the average waste generation rate in tons per day, the waste was also gathered.

The standard point is (5-10%) of the whole population that can be used as a sample of the whole population [12]. The Population of Dadu MC was 102,550 in the 1998 census, now in census 2017 the population of Dadu MC is increased to 171,191 with an annual growth rate of 2.73%, sample population could be derived from it [13, 14]. The sample population can be seen in (Table 1) [12].

Table 1: Sample population as per census 2017

Population in 1998 census	Total population in 2017 Census	Total Households 2017 Census	5% Sample	Number of sampled households (questionnaire)
102,550	171,191	30,953	10,255	100

There was no latest data/ statistics of municipal solid waste management in Dadu city due to poor management and infrastructure of the MSWM system in Dadu City. To collect the data regarding finding out the problems of the management of municipal solid waste, interviews with municipal officials were held and field observations were examined. A household survey was carried using questionnaires distributed among the selected 100 Households based on sample population [11]. The wastes produced by inhabitants were congregated and examined thrice a week for four weeks giving a total of 12 samples to conclude the average waste production rate in tons per day [1]. The inhabitants were appealed to dispose of their wastes properly in specified communal skip containers. All produced waste was weighed thrice a week. The households were also asked in order to know waste disposal practices and satisfaction with municipal services. Collected Data through questionnaires and sampling were tabulated and examined using simple frequency distribution analysis in Statistical SPSS and excel [15].

3. Material and Methods

The collection mechanism of Municipal solid waste in Dadu City is the primary System, the waste is collected in communal skip containers and collected garbage is transported/transferred outside of the town nearer to the Dadu canal.

Solid Waste collection is done from the designated points by means of vehicles such as; tractor trolleys and refuses vehicles when necessary to transport the waste to dumping site(s).

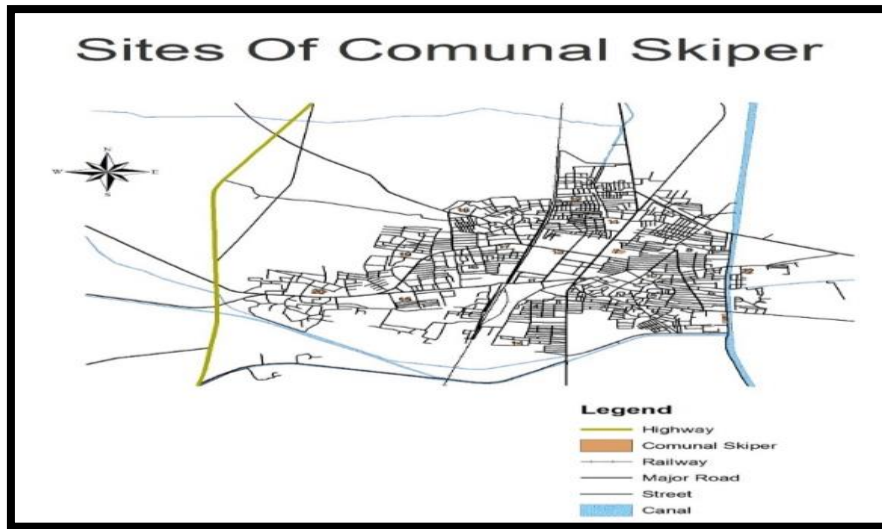


Fig. 2: Location of Sites of Communal Skip Containers in Dadu City.

Collected Municipal Solid Waste from Streets and Roads etc. by Street Sweepers is transferred and transported to the outside limits of the town nearer to the Dadu Canal. There are some areas where open containers have been placed for solid waste collection but due to a lack of civic sense in the people of the town, they are still useless.

Fig 3 is showing the existing dumping sites in Dadu city where inhabitants use to dispose of the solid waste.

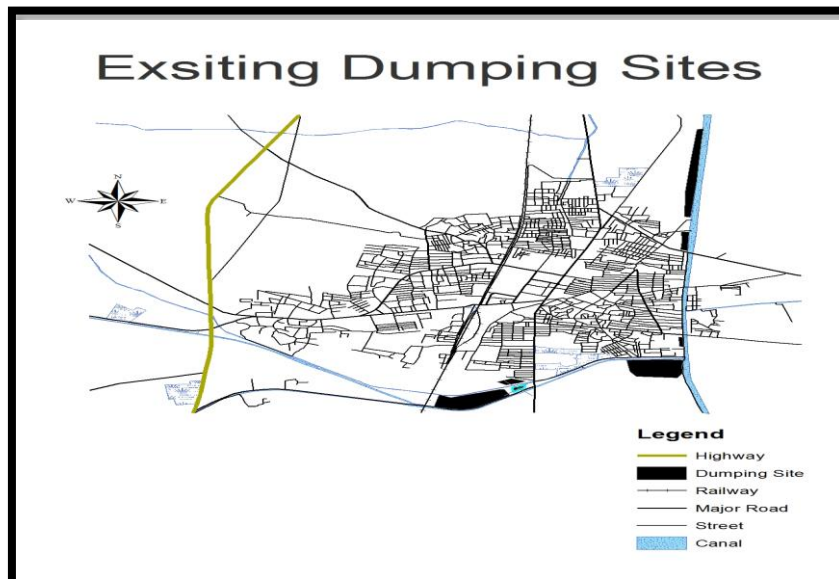


Fig. 3: Location of Existing Dumping Sites in Dadu City.

Average generation: - Table 2 elaborates average generation of municipal solid waste in tons/day study area. About 1029 tons/ day of waste is generated. The data was calculated by researchers where who visit the study area thrice a week for 4 weeks.

Table: Average municipal waste generation (Calculated)

S.No	Week	Net Weight (Tons/day)	Average Generation tons/day (Calculated)
1	1 st	1106	
2	1 st	840	
3	1 st	980	
4	2 nd	1204	
5	2 nd	1050	
6	2 nd	1400	
7	3 rd	1100	1029 tons/day
8	3 rd	780	
9	3 rd	950	
10	4 th	690	
11	4 th	900	
12	4 th	1350	

Source: Through sampling

No. of vehicles and condition: -Table 3 shows the number of vehicles and their condition available in taluka municipal administration, data was collected through interviews with officials of administration in the study area.

Table 3: No of Vehicles

S.No	Vehicle	Quantity	Condition
1	Tractor	3	Good
2	Mazda	3	V Good
3	Communal skip Containers	28	Good
4	Sucker machines	1	Partially Good
5	Lifter machines	1	Good
6	Dozer	1	Fair
7	Fire brigade machines	2	Not working

Gender of Respondents: - Figure 4 demonstrates the total number of respondents both male and female, by whom the researcher filled the questionnaires to find out the problems of the study area. In that, the total number of male respondents was 73 % and female respondents were 27%.

Empty of dust bins: - Figure 5 elaborates the rotten of the people and how frequently they empty the dust bin. 40% empty it on daily basis, 27% people replied every two days, 25% in three days while only 8% replied that they empty it in once a week.

Having Dust Bins: - The data displayed in figure 6 shows that the majority of inhabitants had dust bins in their homes with the percentage of 75%, and 35% said they had no dust bin in homes.

Type of Waste Generation: - The information in Figure 7 demonstrates the types of waste that are generated from the study area. Where 35% of respondents generate food waste, 7% generate ashes waste, 13% generate rubbish waste, 10% said that they generate waste of Bottles and Electric appliances, while the remaining 35% replied that they produced all mentioned waste in their house.

Disposal of Waste: - The result displayed in figure 8 elaborates the location of the disposal of waste that is generated by residents of the selected area. Where, 40% dispose of their wastes in backyards, 20% use communal skip containers for disposing of, 30% replied on open space, 7% said that they dispose the waste at the selected dumping sites while the remaining 3% replied they dispose of the waste any other place.

Satisfaction: - Figure 9 illustrates the satisfaction level of the residents of the study area about the current system of management of municipal solid waste. Where 35% of respondents were satisfied with the current system while 65% were not satisfied with the current system of solid waste.

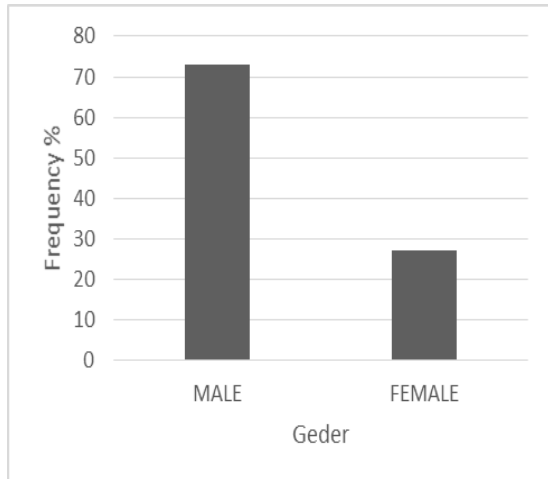


Fig. 4: Gender of respondents

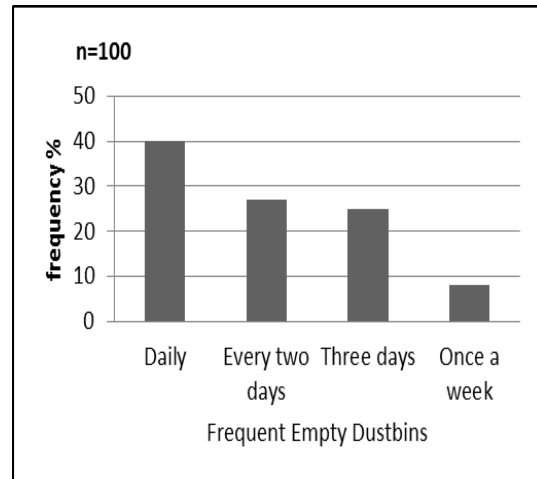


Fig. 5: Frequent empty dustbins

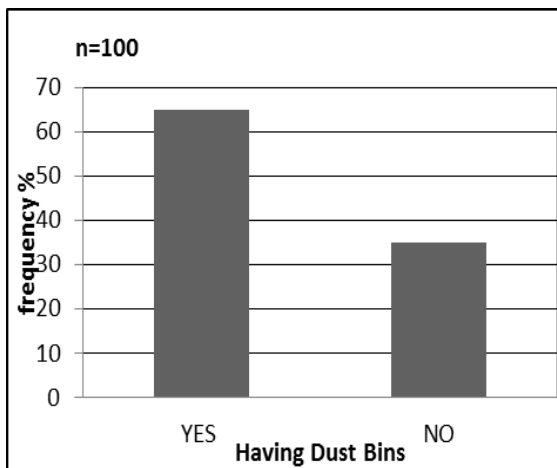


Fig. 6: Availability of dustbins

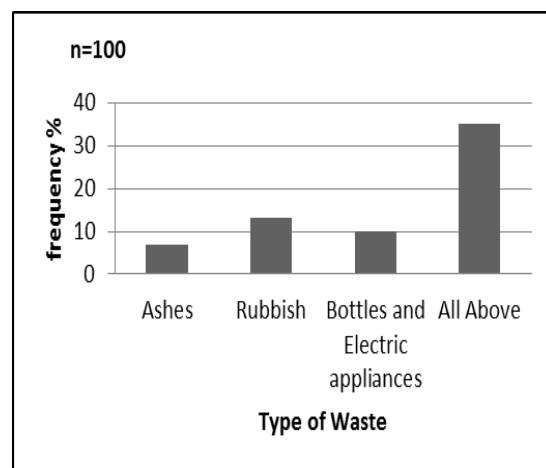


Fig. 7: Types of waste generated

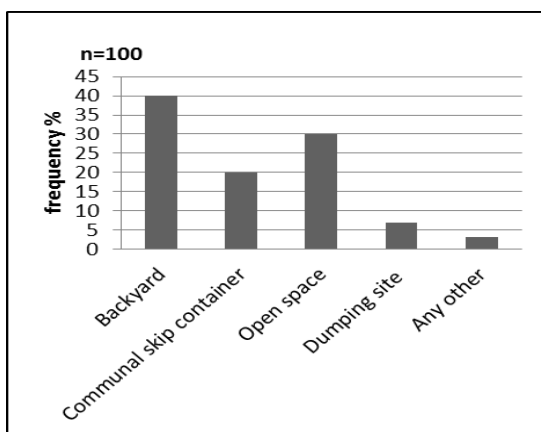


Fig. 8: Disposal of waste

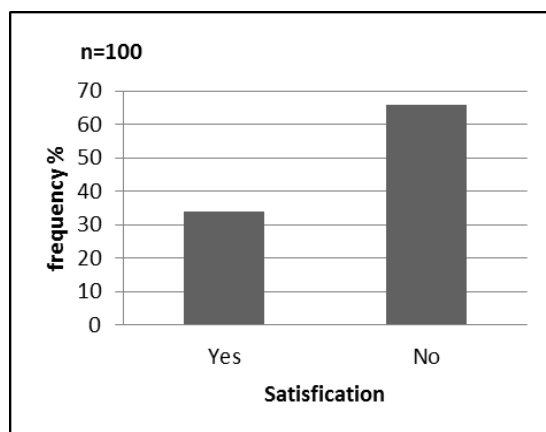


Fig. 9: Satisfaction about waste disposal

4. Conclusion

The current study conducted in Dadu city from Sindh, Pakistan, shows that the existing municipal solid waste management practice is not suitable and is extremely unsatisfactory. There are many inadequacies of the existing

mechanism followed for the management of municipal solid waste. These narrate mostly to insufficient manpower, lack of professionals, and machinery need for properly performing municipal solid waste management actions in the city. Facilities for disposal and collection of municipal solid wastes are insufficiently leaving a significant amount uncollected.

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