

## **PRACTICES AND CHALLENGES OF MUNICIPAL SOLID WASTE MANAGEMENT IN BAHAWALPUR CITY, PAKISTAN**

ADILA SHAFQAT\*, SAJID NOOR AND MUNAZZA FATIMA

*Department of Geography Baghdad ul jadeed campus Faculty of Science, The Islmia University Bahawalpur 63100, Pakistan.*

*\*Corresponding author: adila.shafqat@gmail.com*

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**Abstract:** Management of solid waste is a major public health and environmental concern in urban areas of many developing countries. Municipal Solid Waste Management (MSWM) is a system for handling all the garbage. It encompasses the functions of collection, transfer, resource recovery, recycling and treatment of solid waste. The primary target of Municipal Solid Waste Management (MSWM) is to protect the health of population, promote environmental quality, develop sustainability and provide support to economic productivity. This paper summarizes the salient features of the current scenario of Municipal Solid Waste Management (MSWM) in Bahawalpur and the future directions for improving the situation. The data is collected from the government agency (Tehsil Municipal Administration, TMA) responsible for the management of solid waste, interviews with stakeholders and field surveys of the residential areas and collection sites to understand the practice and discover the lacunae. Further to it is reflected on the public awareness and community participation in MSWM as well as involvement of the private sector and NGOs.

**KEYWORDS:** Municipal solid waste, urbanization, municipality, public awareness, community participation, dump site, Bahawalpur City.

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### **Introduction**

Municipal solid waste management (MSWM) encompass planning, engineering, organization, administration, financial and legal aspects of activities associated with generation, storage, collection, transfer and transport, processing and disposal of municipal solid waste (household garbage and rubbish, street sweepings, construction debris, sanitation residue etc.) in an environmentally compatible manner adopting principals of economy, aesthetics, energy and conservation (Tchobanoglous, Theisen, & Vigil, 1993).

According to 1998 census of the 130.579 million people living in Pakistan, 67% live in rural areas and 33% live in urban areas (Population Census Organisation. Statistics, 1998). During the last decades migration has occurred from rural to urban areas. As Pakistan is witnessing an increase in urban population with an urbanization rate of 32.5% according to the Census Report 1998, (Population Census Organisation. Statistics, 1999) this increasing growth is giving more pressure on existing

MSWM infrastructure.

Bahawalpur (29.9833° N, 73.2667° E) is the twelfth largest city of Pakistan. According to 1998 census report, the total area of Bahawalpur District is 24,830 Square Kilometer. Out of which TMA Bahawalpur comprised of 2,372 square kilometer. Bahawalpur had a total population of 408,395. The average household size was 7.35 persons. The average growth rate in year 1981-1998 was 4.93% (Population Census Organisation. Statistics, 1998).

The large rural influx has, in turn, contributed to overburdening of the urban infrastructure and urban services. In this mushrooming of population, problems of sewage and solid waste disposal also arises. Tehsil Municipal Administration (TMA) is responsible for Municipal Solid waste management in Bahawalpur City. Due to the growth of population and the rural urban migration and emergence of vast commercial activities, handling solid waste has been a serious issue. This problem is further goaded by the lack of financial and human resource trained

in solid waste management practices. Whereas practices like waste minimization is grossly demand and disorganized in most cases. In this situation, the responsible agencies concerned with public health and environment face crisis of ineffective MSWM. Poor visual impact of these solid waste sites will not only have a negative impact on health of citizens but also affect the environmental and cultural aspects of the city. This paper addresses the analysis of present MSWM services in the city and offers some suggestions which can comfort the management system.

## Literature Review

### *Significance of MSWM*

Municipal solid waste management is an important part of the urban infrastructure that ensures the protection of environment and human health (Thailand Environment Monitor, 2003). Human activities create waste and the way that waste is handled, stored, collected and disposed of can pose risk to the environment and health. Solid waste management include all activities that seek to minimize health, environmental and aesthetic impact of solid waste (Zhu & World Bank, 2007). Solid waste include garbage, construction debris, commercial refuse, sludge from water supply and waste water plants or air pollution control facilities and other discarded materials. Solid waste can come from industrial, commercial mining or agricultural activities and from household and community activities (Hussain, 1998). Proper management of solid waste is critical to health and well being of urban residents (Thailand Environment Monitor, 2003). Solid waste management (SWM) is an integral part of the urban environment and planning of the urban infrastructure to ensure a safe and healthy human environment while considering the promotion of sustainable economic growth. Rapid economic growth by industrialization of the developing countries in Asia has created serious problems of waste disposal due to uncontrolled and unmonitored urbanization (ISWA and UNEP, 2002).

Municipal Solid waste management (MSWM) encompasses the functions of collection, transfer, resource recovery, recycling and treatment. The primary target of MSWM is to protect the health of the population and promote environmental quality, develop sustainability and provide support to economic productivity. To meet these goals, sustainable solid waste management systems must be embraced fully by local authorities in collaboration with both the public and private sectors. Although in developing countries the quantity of solid waste generated in urban area is low compared to industrialized countries, the MSWM still remains inadequate (Henry, Yongsheng, & Jun, 2006).

### *Failures Associated with MSWM*

These major issues can be considered in solid waste management: 1) increasing waste quantities 2) lack of clear definition in solid waste management terms and functions 3) need of clear role and leadership in federal, state and local government 4) need for even and predictable enforcement of regulations and standards. Most of the developing countries are aware of gigantic problem related to MSWM. The financial factor is a major constraint leading to the current negligence of this sector in urban infrastructure (Visvanathan & Trankler, 2003). Nabegu in a study of Municipal solid waste management analysis in Nigeria (Nabegu, 2010) concluded that waste should be managed at the local level instead of the current practice of having a large centralized agency so that local variations can be taken into account. Joseph Kurain in his study in India describe some typical reasons of failures of developing countries in waste for which all elements of the society are responsible, community sensitization and public awareness is low, no system of segregation of organic, inorganic and recyclable wastes at household level. He added that there is an adequate legal framework existing in the country to address MSWM. What is lacking is its implementation (Joseph, 2002). Visvanathan and Trankler added that in Asian countries

MSWM scenario requires immediate attention of the governments and civic organizations to curtail the growing environmental problems (Visvanathan & Trankler, 2003). Henry *et al.*, suggested neighborhood participation, community groups and public based efforts as solution to MSWM failures in developing countries (Henry, *et al.*, 2006)

Solid waste collection by government owned and operated services in Pakistan's cities currently averages only 50% of waste quantities generated, however for cities to be relatively clean at least 75% of these quantities should be collected ("Brief on Solid Waste Management in Pakistan,"). To achieve this level, a large capital investment is required. Demand for services will grow as urban population grows as per capita waste generation rates grow; the later is projected 1 to 3 percent per year. The increase quantity of waste will also place greater demands on the disposal services, thereby exacerbating an already poor situation since present disposal methods for solid waste are totally inadequate. Disposal is by open dumping primarily on flood plains and into ponds, causing significant environmental damage. In addition, due to the lack of adequate disposal sites, much of the collected waste finds its way in dumping grounds, open pits, rivers and agricultural land.

The associated problems in MSWM in Pakistan and particularly in Bahawalpur are inadequate facilities to deal with the shortage of expertise, financial resources, and administrative enforcement of environmental regulations. Coupled with this is the lack of public awareness and environmental ethics that results in uncontrolled solid waste generation and disposal. Lack of awareness in grassroots level of waste generation adds to these problems. As a result there is a threat to public health and environmental quality as well.

### Methodology

This paper is mainly based on the secondary data which was provided by the city agency that handles and manage solid waste management services in the city, namely Tehsil Municipal

Administration (TMA). A series of interviews were conducted with Tehsil Municipal Officer (TMO) for Infrastructure and Service Division, Bahawalpur City to know the applied management and scheme for solid waste collection and analysis. The remaining data was collected from Infrastructure and Service division of TMA which contains, composition of solid waste collected, location of dumping sites, collection and storage methods, area coverage, labor involve and equipments and vehicles used for solid waste management. The data collection is done by direct interview method of different persons in three branches of TMA.

The study is conducted to analyze the following parameters of MSWM:

- Classification and composition of solid waste
- Waste collection and disposal procedure
- Equipment and machinery used for waste collection
- Solid waste management process

### Discussion and Analysis

The suburban areas of the Bahawalpur city generally are densely populated and lack good infrastructure, basic social services and amenities. The suburban population is mainly constituted of rural–urban migrants, poor unemployed persons and low-income workers who live in poor accommodation structures. In Pakistan local authorities are charged with the responsibility of collecting and disposing of solid and liquid municipal wastes within their areas of jurisdiction. Centralized MSW management systems are used by most local authorities in Pakistan. In Bahawalpur City local authority Tehsil Municipal Administration (TMA) is responsible for the solid waste management which encompasses the functions of collection, transfer, resource recovery, recycling, and treatment. To meet these goals, sustainable solid waste management systems must be embraced fully by local authorities in collaboration with both the public and private sectors. The primary target of MSWM is to protect the health of the population, promote environmental quality,

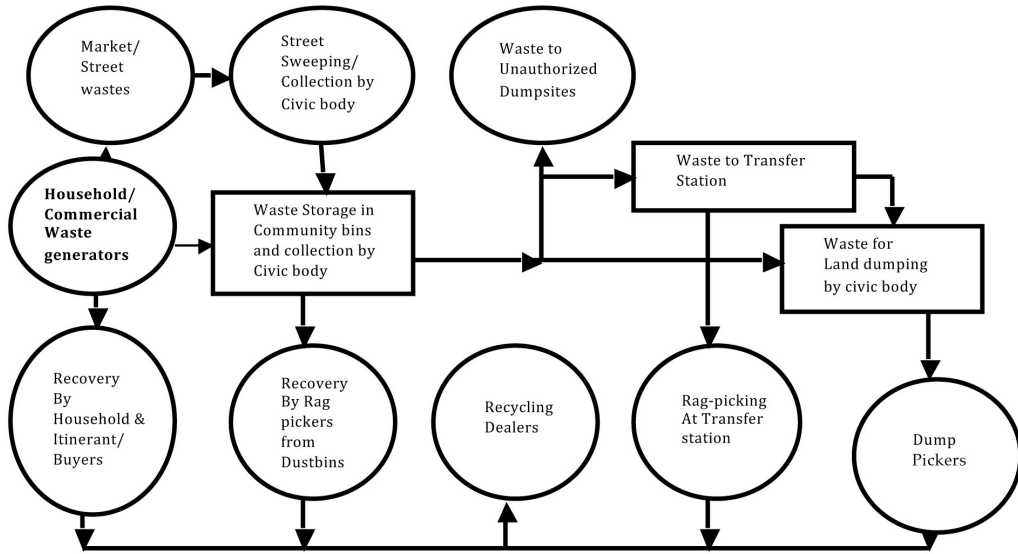


Figure 1: Schematic of Municipal Solid Waste Management Practice in Bahawalpur.

develop sustainability, and provide support to economic productivity.

After getting the information from the interview of TMO Infrastructure and Services division and field observation, present system of MSWM in Bahawalpur is shown in Figure 1. This figure illustrates that waste generated at homes and commercial level go three ways, either (i) to community bins from where TMA trailers collect them, (ii) thrown in streets from where rag pickers collect them, or (iii) directly sold to buyers. From all three sources the waste is dumped in unauthorized dumping sites within the city, after some time either it is sold to another buyer or transferred to large dumping sites outside the cities. Where once again rag pickers have their earnings or it is sold to recycling dealers. This system looks smooth in its schematic way but in real world practice there are some gaps which need to be filled.

Waste generated at households is generally accumulated in small containers until such time, that there is sufficient quantity to warrant disposal into community bins as shown in figure 2. Containers used for household storage of solid wastes are of many shapes and sizes, and are fabricated from a variety of materials. The type of the container generally reflects

the economic status of its users (i.e., the waste generator). Generally speaking, waste collection service does not reach the entire population of the urban centers.

Waste segregation at source is not practiced. Individuals deposit their waste in bins located at street corners and at specific intervals. The containers generally are constructed of metal, concrete, or a combination of the two. Community storage may reduce the cost of waste collection, and can minimize problems associated with lack of on site storage space. However, unless these community storage arrangements are conveniently located, householders tend to throw their wastes into the roadside gutters for clearance by street sweeping crews. Even where storage arrangements are conveniently located, wastes tend to be strewn around the storage area, partly due to indiscipline and partly as a result of scavenging of the wastes by rag-pickers and stray animals. As in figure 3 due to the absence of adequate storage capacity for the refuse generated and poor discipline among the generators, the wastes are continually dumped on the road.

To improve conservancy operations, authorities feel that the lack of civic awareness among city residents is proving to be a major



Figure 2: Community Bins by Local Authorities

Table 1: Service Coverage of Municipality.

Categories	
% age of Area Served	70%
Union Council Served	21
% Age of Population Served	75%
Waste Generation (tons/day)	225 (ton/day)
Waste Collection (tons/daily)	157.5 (ton/day)
Lifted Waste	70%
Un-lifted Waste	30%

Source: Tehsil Municipal Administration, 2010.

hurdle to maintain the city clean. The problem is most acute in slums and low and middle income group areas. It will be nearly impossible for the civic body to provide better surroundings if residents do not take efforts to deposit the waste into the bins and stop the practice of throwing garbage on to the road. A conservancy worker has to cover a certain area by a specific time. If public are going to distribute garbage all along the road, the conservancy worker cannot cover the complete area assigned for him and some areas may not be covered on some days. Because of these poor conditions for temporary storage of wastes, in some areas NGOs have become involved in making arrangements for waste collection from households leading to improvement in local street cleanliness. The detail of solid waste material quantity and served area is described in Table 1.

Municipality serves the 70% area of the entire city. The reason behind this is the expansion of city due to the migration of population. Many slums and new colonies are developing around



Figure 3: Waste Dumped on the Road Side.

Table 2: Waste Composition of Bahawalpur.

Categories	
Paper	3.70%
Plastic and Rubber	7.30%
Glass and Ceramics	1.96%
Wood	1.84%
Textile/ rags	8.45%
Garden Waste	3.10%
Kitchen (organic) waste, Fruit/Vegetable	35.32%

Source: Tehsil Municipal Administration, 2010.

the city due to which authorities are unable to cover the whole area.

According to the municipality estimates every person is responsible for spreading of solid waste in quantity of ½ kg. They collect waste material daily. Sanitary inspector controls all this management of waste.

As Table 2 shows there is considerable content of plastic in the solid waste generated in Bahawalpur. Plastic waste is released during all stages of production. Both the quantity and quality of plastic waste cause environmental problems. Quantitatively post consumption plastic waste is more important. This is so as they are found in large volumes and less weights. Most plastic waste recovered by the formal sector comes from industrial waste, which is less contaminated than the post-consumer stream. This waste is taken care of by the formal recycling sector. The much more heterogeneous domestic waste stream is left to the mercy of the informal sector. Some of the environmental issues of plastic waste are litter, emissions of hydrogen chlorides and

### Major Open Dumping sites in Research Area

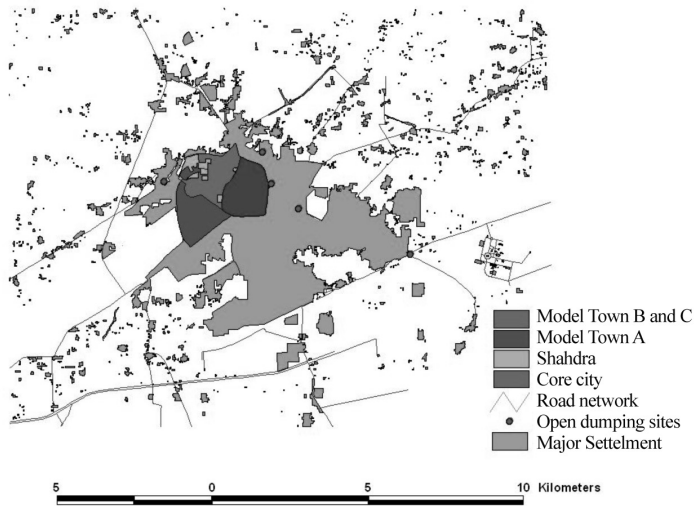


Figure 4: Major Open Dumping Sites in Research Area.

dioxins from incinerators; and contamination from chemical additives plastic waste also presents a direct hazard to wildlife. Eliminating plastic bags improves the quality of compost and reduces the amount of waste requiring disposal.

Different types of vehicles, varying from bullock carts to compactors, are used for waste collection and transportation. However, the general-purpose open body trucks of 5 to 9 tones capacity are in common use. Sometimes tractor-trailers are used despite being noisy and inefficient.

Commercial sector like shops, offices and hotels use the community waste bins and their wastes are also collected along with the household wastes except in a rare number of commercial complexes where they pay a negotiated fee to the Municipal Authorities for collecting waste from their premises. Most of the shops do not open before 9 am and so do not put out their waste out until that time, which will be left mostly on the street until the next day's collection.

In the beginning there was no permanent place for disposal of solid waste. The garbage was thrown where they found a big hole out of

the city or at as place which is free and has no activity, like vegetation etc. The labors pick the garbage and threw it with the help of vehicles or any other sources. After waste collection from all parts of the city, it is stored in temporary containers at the back side Filth Depot of Municipal Corporation. The maximum storage capacity of waste storage is 6cnM. The next step is to transport waste from main filth depot to other temporary disposal sites. There is no permanent legalized dumping site available in the entire city; however the solid waste is being dumped out of the city in suitable places.

Major open dumping sites of Bahawalpur City as shown in the Figure 4 are as follows:

- Near Baghdad station
- Near committee chowk
- Near railway station
- Near sadar puli
- Near bindra basti

It is said that mostly solid waste material was thrown near the Railway Phatak on Multan road. But recently Chandi Pur near Zakhera on Karachi Road is used as permanent dump site for solid waste by city municipality. It was found that little or no consideration of environmental

impacts was paid in the selection of dumpsites, including those currently in use. Convenience took priority in the selection of dumpsites. Inspection and monitoring of the dumpsite was not consistent. No sanitary practices such as application of daily soil cover or fencing were practiced in any of the five local authorities studied. None of the dumpsites in Bahawalpur meet the basic requirements in protecting ground water from pollution by leachate as they have no liners. In the poor suburban zones, indiscriminate disposal of MSW at the riversides, road reserves, and roadsides was common.

The discussions indicate that there are various constraints faced by the authorities and the governments in developing and implementing sustainable solid waste management systems. The community sensitization and public awareness is low. Proper segregation would lead to better options and opportunities for scientific disposal of waste. Paper, plastic, rubber, cans and many other products can be recycled so they must be separated before dumping waste. There is an adequate legal framework existing in the country to address MSWM, what is lacking is its implementation. In spite of a stringent legislation in place, open dumping is the most wide spread form of waste disposal. There is no simple measure to remove or loosen any of these constraints. Some constraints are harder to remove than others. A multitude of measures are usually required to produce a successful outcome of such collaborative project.

### **Conclusion and Suggestions**

The Management of Municipal Solid Wastes continues to remain one of the most neglected issues of urban development in developing countries. Pakistan currently is facing a municipal solid waste dilemma, for which all elements of the society are responsible. In Bahawalpur, like most cities in the developing world, several tons of municipal solid waste is left uncollected on the streets each day, clogging drains, creating feeding ground for

pests that spread disease and creating a myriad of related health and infrastructural problems. A substantial part of the urban residents in the old city and suburban informal settlements of Bahawalpur also have little or no access to solid waste collection services. This is due to lack of proper land use planning which resulted in the creation of informal settlements with narrow streets that make it difficult for collection trucks to reach many areas. The result is that a large portion of the population is left without access to solid waste management making them particularly vulnerable. The possible reasons for poor implementation could be a combination of social, technical, institutional and financial issues. In the light of information gained from interviews of TMOs, field observations and discussion above, following recommendation are suggested to improve the MSWM situation in the city.

### ***National and Local Government's Priorities***

National and local government needs to keep MSWM problem in priority for urban development. To boost the services for solid waste management is the legal responsibility of the provinces and local governments, therefore, the policy makers and provincial and local government representatives must realize the worsening situation and should support to boost up the share of expenditure in the national GDP. Proper and sustainable maintenance of the project running is very important. Rehabilitation of non-functional schemes and development of new projects to ensure the cleanliness in city must be vital. The completion of incomplete schemes must be handed over to TMA at time of devolution.

### ***Participation of Community and Private Sector***

The involvement of people and private sector could improve the efficiency of SWM. Community awareness programs, on use of raw sewage and proper solid waste management techniques should be launched.

### **Source Reduction and Reuse**

Local authorities should undertake management reforms to bring an end to unsightly areas of uncollected or illegally dumped solid wastes. This would involve minimization of waste reaching the drop off points. The 3Rs approach – Reduce, Reuse and Recycle of wastes – is gaining acceptance. Source reduction of MSW involves measures such as: (a) product design and packaging to make them easy to reuse; (b) use of existing packaging materials as opposed to producing new ones; (c) lengthening usage life of products to minimize the frequency of replacement; and (d) developing alternatives to disposal such as composting of grass and food wastes and other compost able solid wastes from farms or markets.

### **Public Awareness**

The problems facing developing countries in handling of municipal solid and liquid wastes are not impossible to solve but they need concerted effort from all sectors of society. MSW management is the responsibility of every resident (Henry, *et al.*, 2006). Public awareness should be created especially at school and colleges, because carelessness of people regarding throwing garbage anywhere and use of garbage bins is very important. Community involvement through neighborhood groups of people from middle and higher income groups and business individuals can provide the needed solution in mobilization of community-based efforts. Clean neighborhood groups can mobilize financial resources and engage private groups or hire private trucks to occasionally collect and dispose MSW from their neighborhoods. Other measures include cultivation of a sense of clean environment through clean community awareness programmes. These can go a long way in sensitizing people to keep the environment clean. Regular activities such as clean-up of the neighborhoods, schools, parks and roadsides can be effective in changing the attitudes even among the poor communities.

An all-inclusive approach should be adopted in order to achieve any meaningful

and lasting solution. A mix of measures and approaches may lead to a successful outcome in the problems and constraints of Municipal Solid Waste Management.

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