

Review and Analysis of Current Solid Waste Management Situation in Urban Areas of Pakistan

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ABSTRACT

Solid waste management (SWM) is one of the major reasons of environmental degradation in Pakistan. Inappropriate management of solid waste causes hazards to dwellers. Recent literature on current SWM practices in five major cities of Pakistan has been reviewed, and an effort has been made to provide a comprehensive review on the total amount of municipal solid waste generated, storage, collection, physical composition, transfer, processing and disposal of SW. There is an overall fragmented approach to the SWM in Pakistan. Inadequate waste collection system exists as it is collected only 51-69% of the total waste generated in a few major cities. Municipal collection of household waste is quite irregular and limited to high-income areas. Generally, inadequate disposal service and no weighing facilities are installed at most of the disposal sites. There is a poor management of hazardous waste and under the current disposal practice no proper method is being employed. The review of the legal framework indicates that there is a need for detailed and clear regulations dealing specifically with solid waste. In addition, promotion of public awareness, legislation, financial and economic calculations, strengthen institutional capacity and regulations enforcement and establishment of a proper sanitary landfill are considered to be principal remedial measures to ensure sound environmental maintenance.

Keywords: *Solid waste management; Household; Legal framework, Environment degradation*

1.0 INTRODUCTION

One of the consequences of the global urbanization is increasing volumes of solid waste. According to estimates about 1.3 billion metric tons of municipal solid waste was generated globally in 1990 (Beede & Bloom, 1995). At present, the yearly generation of solid waste equals to 1.6 billion metric tons approximately. A considerable amount of money goes into managing such huge volumes of solid waste. Asian countries alone spent about US\$25 billion on solid waste management per year in the early 1990s; the figure is expected to rise to around US\$50 billion by 2025 (Hornweg & Thomas, 1999). These figures suggest that solid waste management (SWM) has become a large, complex and costly service. Solid Waste Management (SWM) can be defined as the discipline associated with the control of generation, storage, collection, transfer, processing and disposal of Municipal Solid Waste

(MSW), in a way which is governed by the best principles of public health, economics, engineering, aesthetics and other environmental considerations (Daskalopoulos et al., 1999). The municipalities in developing countries typically lack the financial resources and skills needed to cope with this crisis. Several countries have realized that the way they manage their solid wastes does not satisfy the objectives of sustainable development (Abu Qdais, 2006). This raises the important issue of how to deliver quality service in the face of the financial and skill constraints of the public sector (Mansoor & Azam, 2006). This paper is an attempt to provide a comprehensive review of SWM Practices in urban areas of Pakistan with objectives: to identify the critical problem areas by an objective assessment of the state of practice and to recommend suitable measures for improvement in the current practices.

2.0 CURRENT STATUS OF SWM PRACTICES

Currently solid waste in Pakistan has not been carried out in a sufficient and proper manner in collection, transportation and disposal or dumping regardless of the size of the city: therefore the environmental and sanitary conditions have become more serious year by year, and people are suffering from living such conditions. The scope of problems regarding solid waste management is very wide and involves the consideration of all the aspects relating to solid waste and its management, either directly or indirectly. These aspect may include rate of urbanization, pattern and density of urban areas, physical planning and control of development, physical composition of waste, density of waste, temperature and precipitation, scavenger's activity for recyclable separation, the capacity, adequacy and limitations of respective municipalities to manage the solid waste i.e. storage, collection, transportation and disposal (SAIAN, 1995). According to the 1998 census, of the 130.579 million persons living in Pakistan, 67% live in rural areas, while 33 % live in urban areas. Furthermore, out of 33 % of persons living urban areas, 54 % of them live in ten major cities of Pakistan (GOP, 1996). During the last several decades, migration has occurred from rural to urban areas. The major factors responsible for this migration are: slow progress in the agriculture sector, low crop yields, lack of alternate employment opportunities and environmental degradation due to water logging/salinity, deforestation and desertification. The large rural influx has, in turn, contributed to the overburdening of urban infrastructure and urban services (Robert, 1998).

2.1 Population and Household Estimates

The number and growth of population and households is the foremost factor affecting the solid waste and its management at various stages. The selected cities are growing at a rate ranging between 3.67% to 7.42%, which is much higher than the overall growth rate of Pakistan, i.e. 2.8% (EPMC, 1996). Major cities of them are estimated to double their population in next ten years. These cities are generating high amounts of solid waste which is increasing annually with the respective population growth. The numbers of households also play an important role in generation and collection of the solid waste. The average household size in the selected cities varies from 6.7 to 7.3 persons.

2.2 Waste Generation and Collection Estimates

The average rate of waste generation from all type of municipal controlled areas varies from 1.896 kg/house/day to 4.29 kg/house/day in a few major cities (Pak-EPA, 2005). It shows a trend of waste generation wherein increase has been recorded in accordance with city's population besides its social and economic development. Figure 1 presents city wise waste generation rate with respective daily and annual estimate of solid waste. In Pakistan, solid waste is mainly collected by municipalities and waste collection efficiencies range from 0 percent in low-income rural areas to 90 percent in high-

income areas of large cities (Pak-EPA, 2005). Collection rate of solid waste by respective municipalities ranges from 51% to 69% of the total waste generated (Figure 2) within their jurisdiction. The uncollected waste, i.e., 31% to 49% remains on street or road corners, open spaces and vacant plots, polluting the environment on continuous basis

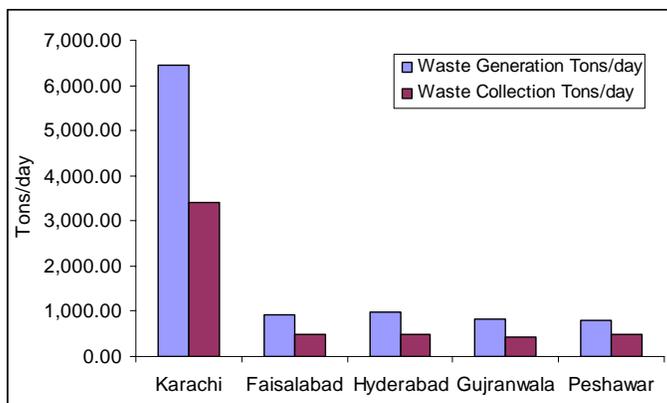


Figure 1 Rate of Generation and Collection of SW in a Few Major Cities of Pakistan

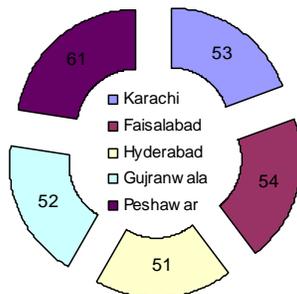


Figure 2 Solid Waste Collection Rate in a Few Major Cities of Pakistan

2.3 Physical Composition of Waste

The move from landfill-based to resource-based waste management systems requires a greater knowledge of the composition of municipal solid waste (Stephen, 2006). Solid waste in Pakistan is generally composed of three categories i.e. biodegradable such as food waste, animal waste, leaves, grass, straws, and wood. Non-biodegradable are plastic, rubber, textile waste, metals, fines, stones and recyclable material includes paper, card board, rags and bones(Figure 3).

A typical data from the United States and Britain are shown in Figure 4 for comparison. Pakistan's urban (municipal) solid waste differs considerably from that of cities in developed countries (which is to be expected).One reason for this is that there is a wide range from poverty to affluence in Pakistan's urban population; another is that much of the waste is reclaimed for recycling at various stages from arising to final disposal.

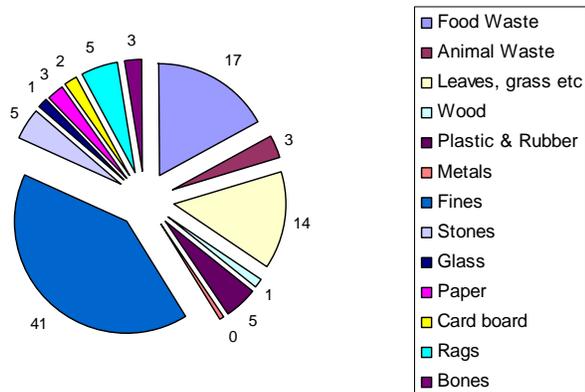


Figure 3 Physical Composition of Solid Waste in Pakistan (% Weight)
Source: EPMC Estimates, 1996

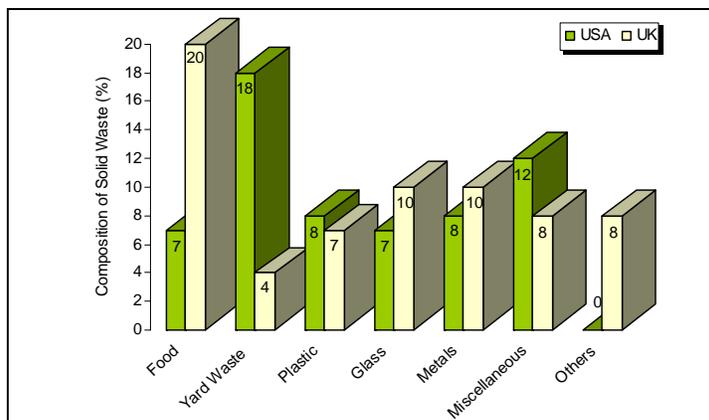


Figure 4 Typical Composition of Solid Waste in U.S.A and Britain
Source (USA): Thomas J. Cichonski and Karen Hill, Ed., Recycling Sourcebook, 1993
Source (UK): Newel, J. Recycling Britain. New Scientific, September 1990:46

2.4 Waste Treatment and Disposal

The waste is disposed off within or outside municipal limits into low lying areas like ponds etc, without any treatment except recyclable separation by scavengers. The land is also hired/leased on long term basis for disposal. Moreover, the least mitigating measures have also never been reported from any municipality. Treatment and disposal technologies such as sanitary land filling, composting and incineration are comparatively new in Pakistan (Veenstra, 1997). Crude open dumping is the most common practice throughout Pakistan and dump sites are commonly set to fire to reduce the volume of accumulating waste, hence adding to the air pollution caused by the uncovered dumped waste itself (Rehan et al, 1998). At present, there are no landfill regulations or standards that provide a basis for compliance and monitoring, but national guidelines for these standards are being prepared by the Consultant under National Environmental Action Plan Support Program (NEAP SP).

2.5 Hazardous Waste

Industrial and medical wastes constitute a larger part on what is known as 'hazardous wastes' (Mato and Kaseva, 1999). In Pakistan, there is no systematic mechanism for the collection and disposal of hazardous waste generated from hospital, industries and agriculture activities. In practice local authorities are handling and disposing of significant quantities of hazardous waste, often without any consistent procedures, and sometimes with no knowledge of the serious problems they may create. Industrial pollution is a major problem in Pakistan. The minimal response of industry to solid waste is mainly due to the poor performance of the sector, lack of information about new technologies and high investments required for changing the processes coupled with weak regulatory mechanism (Ministry of Environment, UNDP and UNIDO, 2000). Pollution problems affect both large enterprises in such industries as chemicals, petroleum refining, sugar, paper and pulp and iron and steel, as well as the many clusters of small- and medium-sized enterprises in industries such as leather, textiles, marble polishing and food processing. Most Pakistani industries, located around major cities, are increasingly polluting streams, rivers and the Arabian sea through untreated hazardous waste. In Karachi alone more than 6,000 industrial enterprises, some 60 % of the country's industry, are located along the coastal belt.

2.6 Informal/Private Sector Involved in SWM

Provision of municipal services by local authorities alone cannot be sustained in most cities of the developing countries (Francos and Bituro, 1999). There are independent operators dealing in waste collection, purchase, separation, restoration, resale and recycling, with the scale of operations ranging from itinerant manual workers to large recycling factories. Kabaris are large-scale waste dealers who operate from shops and warehouses. The Safai Kamai Bank and Waste Busters collect rubbish from households and charge about US\$2 a month, which includes the delivery of about 30 rubbish bags. The refuse is taken to the transfer station where it is sorted out and loaded onto trucks for recycling. Pakistan Environment Welfare and Recycling Program (PEWARP), has established a small production unit manufacturing three organic products from waste purchased from itinerant buyers at Karachi's huge vegetable market. The vegetable waste is crushed and the liquid extract collected which results in liquid concentrate sold as a pesticide, dilute liquid sold as fertilizer and solid residue. Shehri, a Karachi based NGO, also known as 'Citizens for a Better Environment' is primarily concerned with the protection and conservation of the natural and built environment. It has produced recommendations for improved bin designs and promotes awareness on solid waste management. There is strong need to gradually involve private sector in the SWM in other small cities and towns by offering incentives.

3.0 REVIEW OF EXISTING LEGAL FRAMEWORK ON SOLID WASTE MANAGEMENT

Presently, legal rules and regulations dealing with solid waste management in Pakistan are inadequate and outdated (PEPA, 1997). There are Guidelines for Hospital Waste Management since 1998, giving detailed information and covering all aspects of safe hospital waste (Ministry of Health, 2002). However, these guidelines are not implemented. There are no systematic approaches to medical waste disposal. Hospital wastes are simply mixed with the municipal waste in collecting bins at roadsides and disposed of similarly. Some waste is simply buried without any appropriate measure. There is an urgent need that the solid waste management law should legislate. The laws should be legislated include activities concerned with the waste management; what part citizen; enterprise and government should take of responsibilities. Factory or company should treat especially hazardous waste coming

out from polluting industrial units, which generated these under governmental control. Citizen, businessman, factory owner and even government should receive a penalty for activity in violation of the law of Solid Waste Management.

4.0 REVIEW OF EXISTING INSTITUTIONAL MECHANISM

Planning & Development Division at Federal and P&D Departments at provincial level are responsible for preparation of development plans and allocation of resources. The Ministry of Environment is responsible at federal level for policies and programmes. PEPA (Pakistan Environmental Protection Agency) and Provincial EPA's are main regulatory bodies for implementation of Pakistan Environmental Protection Act 1997. Town, Tehsil Municipal Administration (TMAs) are responsible for solid waste collection, transportation and disposal. TMA's due to lack of funds, rules, standards, expertise, equipment and vehicles are unable to handle the continuously increasing volumes of municipal waste.

5.0 CONCLUSION

The overall conclusion of the study on present status of solid waste management in Pakistan as follows:

- There is a limited focus on control mechanisms which is adversely effecting on safety, health and the environment.
- Regulations are inadequately enforced and SWM does not seem to be a priority.
- None of the cities has an integrated solid waste management system
- Collection rate 51-69 % of total waste generated.
- Hospital and industrial wastes are treated as ordinary waste
- A lot of potential for recycling and involvement of private sector which is overlooked
- No disposal facilities
- Open burning of waste or open disposal is most common practice.
- No weighing facilities are installed at any disposal sites
- Open burning of non-degradable components like plastic bags are adding to air pollution
- Much of the uncollected waste poses serious health hazards

6.0 RECOMMENDATIONS

Following recommendations are proposed for sustainable SWM:

- The involvement of people and private sector through NGOs could improve the efficiency of SWM.
- Public awareness should be created especially at primary school.
- Littering of SW should be prohibited in cities, towns and urban areas.
- Moreover, house-to-house collection of SW should be organized.
- The collection bins must have a large enough capacity to accommodate 20% more than the expected waste generation in the area.
- Municipal authorities should maintain the storage facilities to avoid unhygienic and unsanitary conditions.

- Proper segregation would lead to better options and opportunities for scientific disposal of waste.
- An open dump or an uncontrolled waste disposal area should be rehabilitated. It is advisable to move from open dumping to sanitary landfilling in a phased manner.
- Landfilling should be restricted to non-biodegradable, inert waste and other waste that are not suitable either for recycling or for biological processing.

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