

## **AN ASSESSMENT OF HOSPITAL WASTE MANAGEMENT PRACTICES IN LAHORE, PAKISTAN**

A. Riaz and I. Butt

Department of Geography, University of the Punjab, Lahore

Corresponding author's Email: anam\_riaz@ymail.com

**ABSTRACT:** The present research examined the traditional hospital waste management system prevailing in the hospitals of Lahore, Pakistan. Questionnaire technique was used to acquire primary data in this study. Sixty-five hospitals including fourteen government, seven semi-government and forty-four private hospitals were randomly selected and visited during October 2016 to January 2017. The collected data was tabulated in Microsoft Excel 365 and SPSS 22, whereas maps were prepared in ArcGIS 10.1. Pearson correlation test was performed to check the relation between amount of hospital waste generation and number of beds. Positive correlation was found between hospital waste generation and the number of beds available. The results revealed that 43.1% of the surveyed hospitals had less than 100 beds capacity. 42 % hospitals produced less than 100 Kg waste and 12 % hospitals produced more than 700 Kg waste per day. 46% hospitals lacked in properly trained staff for waste handling, 39 % hospitals collected hospital waste on daily basis. Recycling of general waste was practiced by 68% hospitals, while only five hospital had the facility of incinerator. On overall basis, HWM practices were found satisfactory as per WHO guidelines in all government hospitals.

**Key words:** Hospital waste management, incineration, recycling, Pearson correlation, Lahore.

(Received 20-06-19

Accepted 02-09-19)

### **INTRODUCTION**

Medical care is essential for our life and well-being. Hospitals generate different kinds of wastes as a result of a variety of medical treatments and research. The amount of waste produced through medical activities is a real problem to human world as it is growing over the years (Shinawey *et al.*, 2017). Hospital waste is a matter of serious concern not only to the workers associated with the hospital, but also to the local occupants and on the surroundings. In the past decade, the generation rate of hospital wastes has amplified swiftly due to the increased number and size of hospitals, medical services, and use of medical disposable products (Nasir *et al.*, 2016). The problem demands attention towards attaining the objectives of safe collection, separation, transportation, treatment and disposal of infected hospital wastes. The amount of hospital waste produced is depends on the hospital policies, practices and type of care being provided. It is witnessed that the hospital waste produced in industrialized countries ranges from 1-5 Kg per bed per day. Whereas, the developing countries generate hospital waste between 1-2 Kg per bed per day (Hameed *et al.*, 2017; Kagonji, 2010).

In Pakistan, 15% of the generated hospital waste is unsafe waste, while 85% is non-hazardous waste which can be considered as normal waste (Sobia *et al.*, 2014). Currently, nearly 10,000 hospitals are operational in the country that produce almost 25,000 tons of waste annually at rate of two Kg waste per bed per day (Kumar

*et al.*, 2010). Unfortunately, the traditional hospital waste management (HWM) is inefficient and not following the guidelines of World Health Organization (WHO). Lack of trained healthcare workers, inadequate knowledge of careful waste handling, poorly managed data on waste generation and associated health risks are major challenges faced by the authorities responsible for HWM within the country (Ali *et al.*, 2017). Several researchers have studied the existing practices of HWM in Pakistan and challenges faced in this perspective. Ali *et al.* (2014) examined the curative measures adopted by healthcare authorities for hospital waste handling in the country. Hameed *et al.* (2017) highlighted the various environmental issues faced during HWM in the different hospitals of Faisalabad, Pakistan. Rasheed *et al.* (2005) examined the different techniques used for HWM practiced in the teaching hospitals of Karachi city, Pakistan.

Keeping in mind, the above discussion this present research aimed to analyze the situation of existing practices of HWM in the public and private hospitals of Lahore city.

### **MATERIALS AND METHODS**

**Selection of study-area:** Lahore city was selected for the present research (Fig-1). It is situated between 31°15' to 31°43' north latitude and 74°10' to 74°39' east longitude. It is bordered by Sheikhpura district to the north and west, by India on the east, to the south by Kasur district.

Lahore is the provincial capital of Punjab, second largest urban center of Pakistan with a population size of 11.13 million (Anonymous, 2017). Since historic time periods, Lahore has remained the central hub for cultural, educational, commercial, administrative and health related activities not only at regional level but also at

national and to some extent and at international level. Currently, there are 75 registered public and private sector hospitals situated in the different parts of the city providing state of the art health facilities to the patients coming from across the country (Nasir *et al.*, 2016).

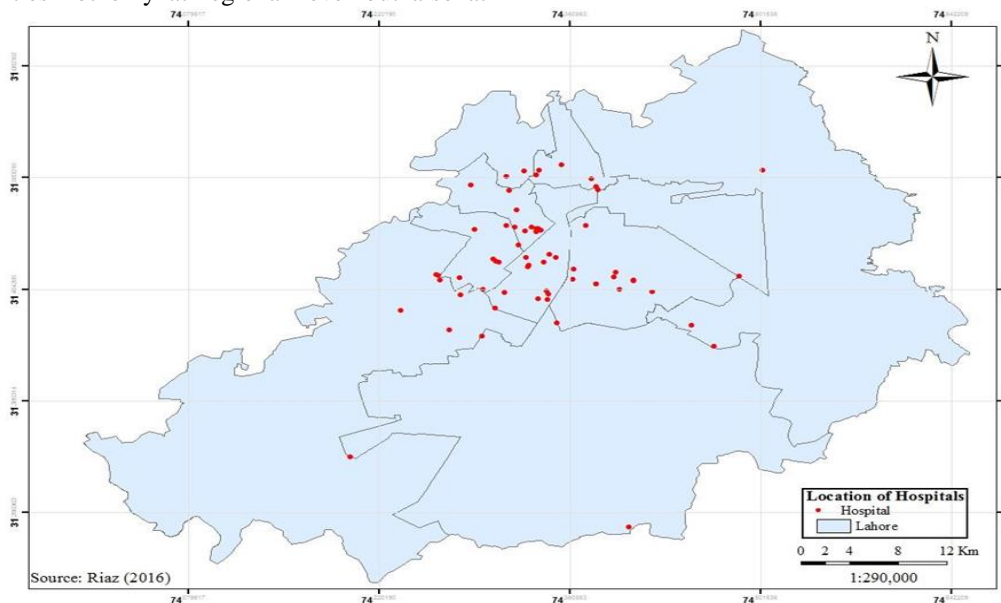


Figure-1: Location of surveyed hospitals in Lahore city.

**Collection and analysis of data:** For present research, primary data was obtained by preparing a questionnaire and filled through field survey during October 2016 to January 2017. A sample size of 65 hospitals was selected by following the guidelines given by Gay (2000). Out of total, 14 hospitals were government, 07 were semi-government, and 44 were private hospitals (Fig-2). The questionnaire consisted of three sections and 20 questions inquiring following information:

- General information of hospital such as total number of beds, departments, number of patients visiting on daily basis, type and production of waste etc.
- Existing waste management practices such as collection, segregation, methods used for waste reduction, storage, and final disposal of hospital waste.

<b>Government Hospitals</b>	Shiekh Zayed Hospital	Iqra Medical Complex	Hijaz Hospital
Services Hospital	The Indus Hospital	Tariq Hospital	Adil Hospital
Institute of Mental Health	Sharif Medical Hospital	National Hospital	Masood Hospital
Punjab Institute of Cardiology	Shalamar Hospital	Avicenna Hospital	Rabia Welfare Hospital
Jinnah Hospital	Nawaz Sharif Hospital	Hamid Latif Hospital	Arif Memorial Hospital
General Hospital	INMOL Hospital	Cavalry Hospital	Shifa Hospital
Children Hospital	<b>Private Hospitals</b>	Doctor Hospital	Omar Hospital
Sir Ganga Ram Hospital	Punjab Social Security	CMH Hospital	Al-Khidmat Hospital
Gulab Devi Chest Hospital	Ittefaq Hospital	Fauji Foundation	Lahore Psy chiatric Hospital
United Christian Hospital	Mid-City Hospital	Zainab Memorial	Sharif Hospital
Mian Munshi Hospital	Raza Hospital	Ghurki Trust hospital	Ali Hospital
Kot Khwaja Saeed Hospital	Fatima Memorial	Mustam Hospital	Musarat Razaq Hospital
Said Mitha Hospital	Farooq Hospital	Iltaf Siyaal Hospital	Saira Memorial Hospital
Mayo Hospital	Shaukat Khanum Hospital	Geo Hospital	Wazir Hospital
WAPDA Teaching Hospital	OMC Hospital	Ayesha Hospital	Hamza Hospital
<b>Semi Government</b>	Mumtaz Bakhtawar Trust Hospital	Al-Razi Hospital	Ayesha Saddiqa Hospital
Rehmatul lil Alamin Hospital	Salma Sarfraz Hospital	Naz Hospital	Rasheed Hospital

Figure-2: List of surveyed hospitals

The questionnaires were filled by interviewing the hospital admin managers, medical superintendents and other administrative staff. Afterwards, the collected data was further arranged in Microsoft Excel 365 and was incorporated to calculate the frequency and percentages preparation of graphs and tables.

Person product moment correlation test was used to measure the relationship between Hospital waste generation and number of beds available through SPSS 22 by using following formula:

$$r = \frac{N \sum xy - \sum (x)(y)}{\sqrt{N \sum x^2 - \sum (x^2)} [N \sum y^2 - \sum (y^2)]}$$

Where

r = Correlation coefficient Pearson r

N = Number of each data set value

$\sum xy$  = sum of products of paired scored

$\sum x$  = sum of x scores

$\sum y$  = sum of y scores

$\sum x^2$  = sum of squared x scores

$\sum y^2$  = sum of squared y scores

Moreover, GPS device was used to acquire the geographical coordinates of the surveyed hospitals and were moved to the Google Earth Pro in my places. Then

with the help of Kmz converter a shape file was formed using further in ArcGIS 10.1 for preparing location map and so on.

## RESULTS

The surveyed hospitals included specialized, general and teaching hospitals with various departments like Pulmonology, Pathology, Ophthalmology, Oncology, Gynae and obstetrics, Neurology etc. Furthermore, 43.1% of the surveyed hospitals had less than 100 beds facility available for indoor patients. Besides, majority of government hospitals had more beds capacity such as Mayo hospital with 2400 beds, Ghulab Devi with 1500 beds, and Jinnah hospital with 1450 beds capacity. The outpatient door visits to surveyed hospitals were found between 500 to more than 4000 patients on daily basis. Great variations were observed in the daily generation of hospital waste (see Fig-3). Most of the hospitals (27) were producing less than 100 Kg waste per day, yet only eight hospitals were found producing waste more than 700 Kg per day and they included Mayo, Jinnah, Services and Ghulab Devi hospitals.

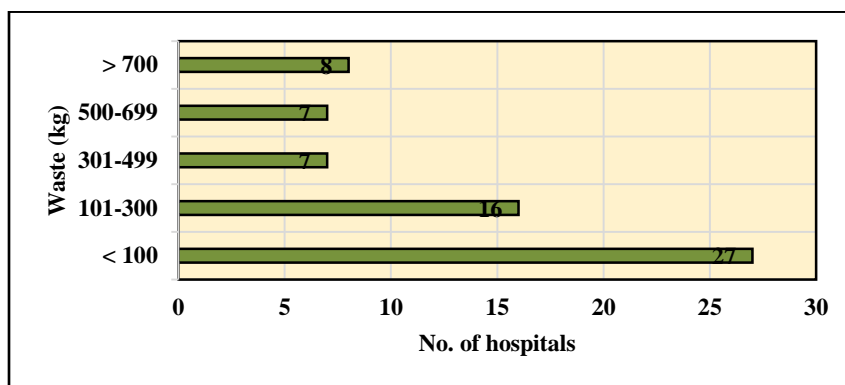


Figure-3: Production of hospital waste by surveyed hospitals

Hospital waste consists of different types of waste generated during different medical treatment and services and classified into various types by World Health Organization (WHO, 2014). Similarly, the

surveyed hospitals also produced a variety of wastes including general, chemical, pathological, infectious, genotoxic, radioactive, pharmaceutical and other (Fig-4).

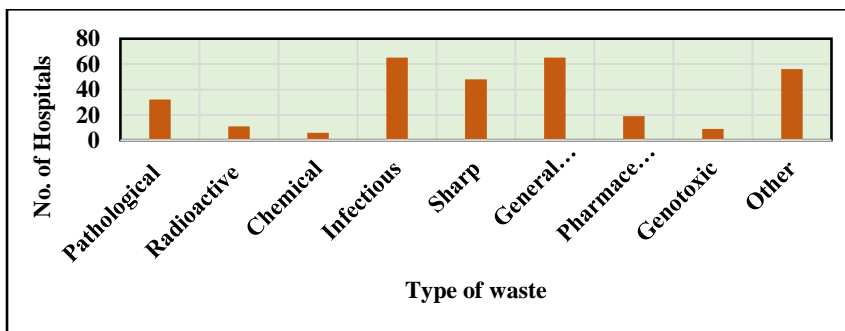
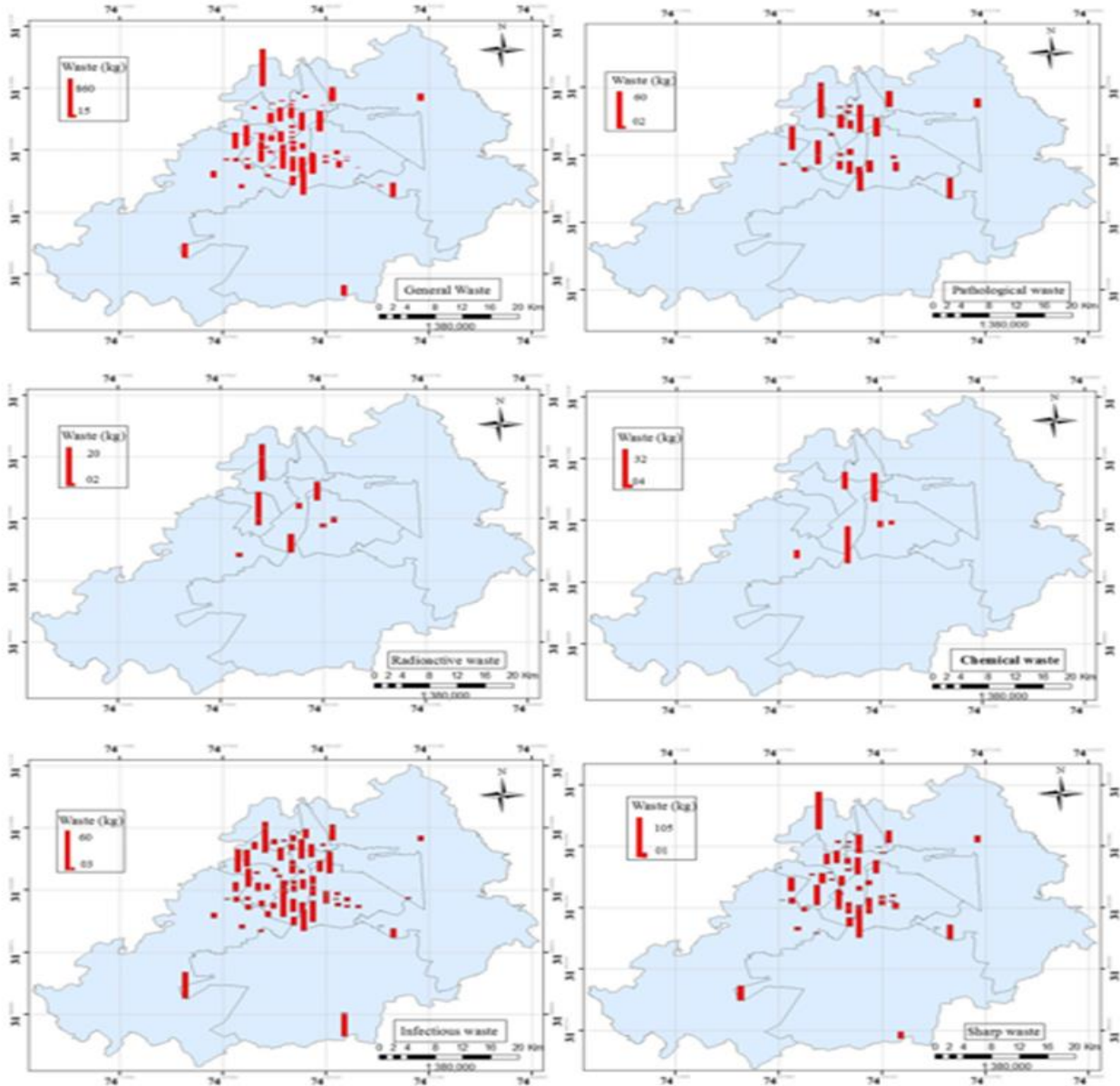


Figure-4: Classification of waste produced by hospitals

General and infectious wastes were the most abundantly produced wastes produced by every hospital, yet chemical, genotoxic and radioactive wastes were produced by few hospitals. Moreover, the production of general waste ranged between 100 to more than 900 Kg

per day among the surveyed hospitals. On the contrary, all other types of waste were produced in quite less quantities ranging between 20 to 100 Kg per day by the surveyed hospitals (Fig-5).



**Figure-5: Production of different types of wastes by hospitals.**

## DISCUSSION

Only 35 hospitals had properly trained staff for careful handling of hospital wastes which included all government, semi government and some reputable private hospitals. 25 of the total hospitals were found to collect the waste on daily basis which were mostly government and semi-government hospitals. Waste

segregation of biodegradable and nonbiodegradable waste was being strictly practiced by all hospitals by using color coded bags technique. Moreover, 44 of the surveyed hospitals recycled their general waste such as papers, tissues etc. to reduce the amount of waste. Temporary storage for hospital waste was maintained at all hospitals with varying storage capacity ranging between 200 to more than 600 sqft. All hospitals sent

their non-infectious wastes to the traditional municipal dumpsites of the city that included Mehmood Boti landfill, Baggrain and Saggian dumpsites for disposal. Incineration method was used for disposing infectious waste, yet the facility of incinerator was only available at 05 hospitals namely Children’s hospital, Shaukat Khanum, Shaikh Zaid, United Christian and Shalamar

hospitals. The rest of the hospitals used the facility of incineration as mentioned in Fig-6.

Finally, the results of Pearson correlation test proved a positive correlation between the amount of hospital waste and bed capacity available at hospitals (Table-1).

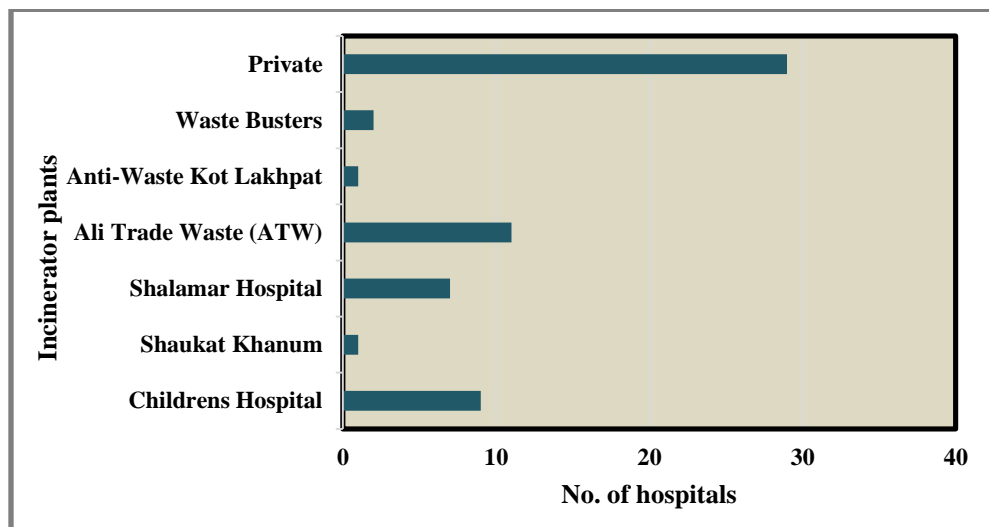


Figure-6: Incineration facility providers to surveyed hospitals

Table-1: Correlation between amount of waste and beds capacity.

Pearson Correlation		Waste	No of beds
Waste	Pearson correlation	1	.934
	Sig (2-tailed)		.000
	N	65	65
No of beds	Pearson correlation	.934**	1
	Sig (2-tailed)	.000	
	N	65	65

It was found that with the increase in bed capacity, waste generation was also found to be increasing in amount. Meaning that hospitals with large bed capacity were generating more waste as compared to those with less bed capacity.

**Conclusion:** The study concludes that the existing HWM practices were found satisfactory in the government hospitals in Lahore city as per WHO guidelines. Hence private hospitals faced problems like lack of trained staff, less temporary storage capacity, absence of proper incineration and poor practices regarding waste reduction and so on.

## REFERENCES

Ali, S., U. Mahmood, A.U. Malik, F. Aziz, R.S. Naghman and I. Ahmed (2015). Current hospital waste management practices in Pakistan: Case study and curative measures, *Public Health Prev. Med.* 1(3): 125-129.

Ali, S.M., W. Wang and N. Chaudhary (2017). Assessment of hospital waste management in a major city of Pakistan. *Int. J. Environ. Waste Manage.* 24(5): 131-142.

Gay, L.R. (2000). Educational research: Competencies for analysis and application. 5<sup>th</sup> Ed. Florida International University. USA. 111-131.

GOP (2017). Provisional summary results of 6th population and housing census-2017. Pakistan Bureau of Statistics, Islamabad (Pakistan), 1-13p.

Hameed, K., O. Riaz and H. Munawar (2017). Types of hospital wastes and waste generation in different hospitals of Faisalabad city, *Pak. J. Basic Appl. Sci.* 13(1): 386-391.

- Kagonji, I.S. and S.V. Manyele (2010). Analysis of measured medical waste generation rate in Tanzania District hospitals using statistical methods. *Africa J. Environ. Sci.* 5(10): 815–833.
- Kumar. R., E.A. Khan, J, Ahmed, Z. Khan, M.M. Nousheen and M.I. Mughal (2010). Healthcare waste management in Pakistan: Current situation and training options. *J. Ayub Med. College.* 22(4): 102-106.
- Nasir, M.I., A. Hanif, U.J. Iqbal, T. Ashraf (2016). A comparative study of hospital waste management in eight hospitals with respect to rules 2005. *J. Fatima Jinnah Med. Uni.* 10(1): 10-14.
- Shinawey, A.K., A.A. Attala, K.M. Abbas and S.A. Atlam (2017). Assessment of hospital waste management in Tanta university. *Tanta. Med. J.* 45(1): 146–154.
- Sobia, M., S.A. Batool and M.N. Chaudhary (2014), Characterization of hospital waste in Lahore, Pakistan. *Chin Med J*, 127(9): 1732-1736.
- WHO (2014). *Safe Management of Waste from Healthcare.* 4<sup>th</sup> Ed. World Health Organization.1-242.