

HEALTHCARE WASTE MANAGEMENT IN KARACHI, PAKISTAN

Case Study Report

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October 2008**



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**Prepared for WASTE
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LIST OF ABBREVIATIONS

AKHU	Aga Khan University Hospital
BHU	Basic Health Unit
CC	Consultancy Clinic
CDGK	City District Government Karachi
CHK	Civil Hospital Karachi
EIA	Environmental Impact Assessment
GoP	Government of Pakistan
GoS	Government of Sindh
HCW	Health Care Waste
HCWM	Health Care Waste Management
HCWMS	Health Care Waste Management System
HFC	health care Facility
JPMA	Journal of Pakistan Medical Association
KMC	Karachi Metropolitan Corporation (now defunct)
LNH	Liaquat National Hospital
NEQS	National Environmental Quality Standards
NGO	Non Government Organisation
NWFP	North West Frontier Province
OMI	Orthopedic and Medical Institute
PEPO	Pakistan Environmental Protection Ordinance (1997)
PMA	Pakistan Medical Association
PMRC	Pakistan Medical research Council
PPC	Pakistan Panel Code
SCOPE	Society for Conservation and Protection of Environment
SEPA	Sindh Environmental Protection Agency
SIUT	Sindh institute of Urology and Transportation
SLGO	Sindh Local Government Ordinance (2002)
SWM	Solid Waste Management
UWEP	Urban Waste Expertise Programme
WHO	World Health Organisation

GLOSSARY OF LOCAL TERMS

- Kundi* It is a street level or sub-neighbourhood level collection point of waste. Sweepers collect the household waste and transport it to this location through mono-wheel trolley and dump it at this point. Municipal collection van collects the waste from the *Kundi* and transport it to the landfill site.
- Taluka* It is the local term used for a sub-district in a non urban context. Its urban equivalent is a town. Karachi, for example, is divided into 18 towns.
- Bhangi* Sweeper

CHAPTER 1 APPROACH AND METHODOLOGY

The approach adopted for fact finding and analysis was based on the review of relevant literature, contacts with the key informants related to the health care waste management, staff of the key hospitals, NGOs and professional organizations directly associated with HCWM, patients and staff of the HCWM, municipal staff related to HCWM and journalists who covered the related issues in the recent times.

The procedure adopted for obtaining information was based on informal interview method through a checklist derived from the terms of reference of this exercise. The interviews were conducted on the actual locations in order to obtain the photographs of some of the key activities and situation. Experience showed that the staff and management was very reluctant to share the information regarding waste management as they were of the view that it may generate negative image about the upkeep and management of the facilities. It was after repeated assurance and follow up that this information could be acquired and photographs taken, especially of the critical points of waste generation/disposal cycle. The HCWM has not been undertaken as an organized project or programme in an integrated manner during the past by the government and even by private healthcare service providers. Therefore quantitative information is virtually non-existing in this sub-sector. The work has relied on the estimates by the experts, past references and observations where ever possible.

1.1 Background

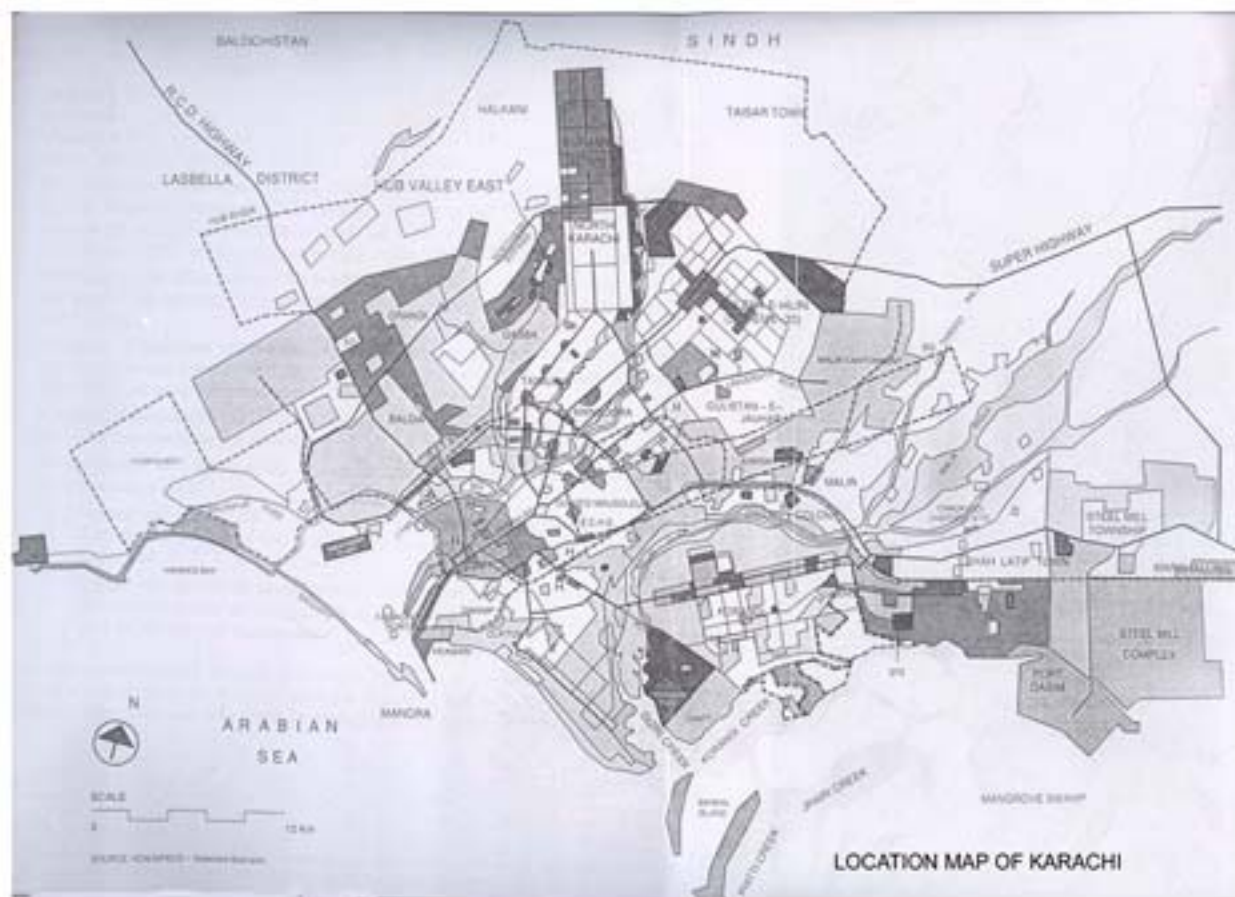
A study on the topic was done by the Consultants in 1997 in Karachi, Pakistan supported by WASTE Consultants, the Netherlands under the Urban Waste Expertise Programme (UWEP) to examine, analyse and document the Healthcare Waste Management System (HCWMS) in the city. Being a pioneering study of its kind, it attempted to generate a useful information base for the sector for the benefit of stakeholders. The study covered major public and private sector healthcare facilities, laboratories / diagnostic centres, basic health units, maternity homes, buyers and sellers of recyclable material generated from healthcare waste. Drawing the classification of waste material and procedures, the healthcare waste study applied the knowledge base on the local situation of Karachi. In this respect, the legislative and administrative framework of HCWM was also analysed for its adequacy, relevance, effectiveness and degree of implementation. The situation analysis produced many useful inferences pertinent to the situation.

It was found that HCWM is far below the desirable level due to lack of understanding about its significance by stakeholders, absence of professional input and capability to deal with the issues and general slackness mainly on the part of facilities managers. Inadequately trained staff causes major impedance in the creation of a proper system which was found lacking in almost all public and most of the private hospitals, few exceptions notwithstanding. Inappropriate tools and equipment; limited awareness about the contagious nature of waste material; low priority status of HCWM; ineffective monitoring of processes and procedures as well as a general scarcity of resources have compounded the matters. HCW is collected and disposed with municipal solid waste, which is very dangerous for public health in general, and residents of such localities in

particular that are close to the disposal points. The attraction of earning a few hundred rupees by the selling of recyclable material compels the lower sanitary staff to sift and separate plastic supplies / consumable items in a hazardous fashion. The careless disposal of liquid waste related to healthcare facilities into the common disposal stream of municipal sewage is also a harmful practice that continues unabated.

The study recommended many steps. Raising awareness through organized campaigns amongst stakeholders was a key suggestion. A detailed study was also suggested to establish the various parameters pertinent to HCWM. Training of sanitation staff, provision of essential props, separation of healthcare waste from general waste at source, safe transportation modes, procurement and installation of incinerators, separation of harmless and non-hazardous recyclables and development of health care waste management plans were some recommendations. The present study is an attempt to re-visit the scenario to examine the status of the HCW sector in the contemporary perspective.

1.2 The Context



Karachi is the largest city of Pakistan both in terms of area and population. According to estimates of Karachi Strategic Development Plan 2020, the population of the city was 16 million as per 2006 figures with an average annual growth rate of 4.15 percent. The total area of Karachi

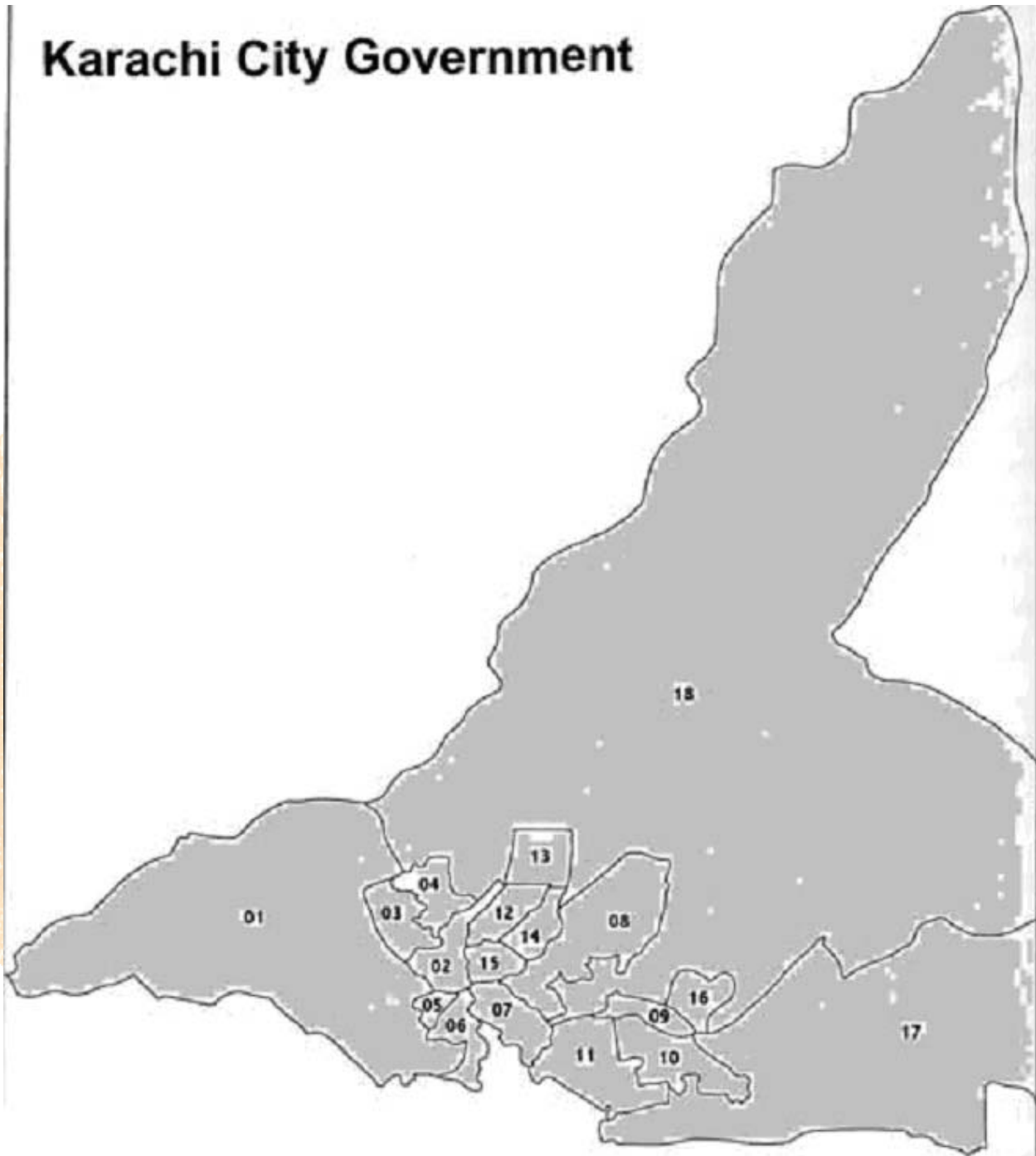
is 3600 sq.km approximately. The city is now administratively divided into 18 towns and 178 union councils according to the provisions of Sindh Local Government Ordinance 2002. The city also contains six cantonment boards and several federal and provincial land holding agencies that manage urban areas in their respective jurisdictions. Karachi is the prime city of Pakistan. It contains about 7 percent of the total national population and 22 percent of total urban population. The city contributes 15 percent of Gross Domestic Product of the country. It is the financial, commercial and trading hub of the country due to the existence of two functional ports and the largest airport, it is also the centre of a wide spread informal economic activities due to an expanding service sector. Being relatively developed in comparison to the other adjoining regions, the city attracts a sizable number of visitors and immigrants who take residence for varying time periods to benefit from the healthcare facilities, educational institutions and placement in the diversified job market. It makes the reason that most of the public and several of private sector healthcare facilities are over utilized with an increasing clientele that comes from outside the city.

From socio-economic perspective, the city is a conglomerate of peoples with heterogeneous background. Before independence from the British, the city had a Sindhi speaking Hindu community with Muslims, Christians and Zoroastrians as the following groups. After the independence, many immigrants entered the city from various locations in India. Urdu speaking migrants from the United Province of India and elsewhere constituted the dominant community. In the later phases, Pushto speaking people from the North West Frontier Province (NWFP) also came and settled in Karachi in search of hard labour related employment opportunities. Thereafter, people from Punjab, Sindh, Balochistan and even from many other countries settled in Karachi. At present, the city can be truly termed as a cosmopolitan urban centre due to its diverse socio-ethnic background.

In Karachi, healthcare is catered for by the public and private sectors. The basic infrastructure consists of primary health care units. Preventive programs and general hospitals for the public were established by the government and semi-government organizations. Though some notable internal improvements were made from time to time, the infrastructure did not expand spatially in line with the aerial expansion of the city. Since the public sector facilities remained highly centralized in a few locations, they became largely inaccessible to population of most city sectors. This provided the stage to the private sector to establish clinics and hospitals in the residential neighbourhoods.

Karachi's health care system is facing issues that are both challenging and growing as the city rapidly expands. Health care needs by the year 2020 will have grown exponentially from where they are today. An estimated 90 percent the city's population will have to rely primarily on the public health care system, including its primary, secondary, tertiary and specialized centers.

Karachi City Government



01. Keamari	07. Jamshed Town	13. New Karachi
02. S.I.T.E	08. Gulshan-e-Iqbal	14. Gulbarg
03. Baldia	09. Shah Faisal	15. Liaquatabab
04. Orangi	10. Landhi	16. Malir
05. Lyari	11. Korangi	17. Bin Qasim
06. Saddar	12. N. Nazimabad	18. Gadap

Pakistan as a whole is in the middle of an epidemiological transition, almost 40 percent of the total burden of disease is now due to infectious / communicable diseases such as diarrheal disorders, acute respiratory infections, malaria tuberculosis, hepatitis B and C, HIV/ Aids and preventable childhood illnesses. Non-communicable diseases, including a high rate of breast cancer, hypertension, diabetes, systemic heart disease and lung cancer present more traditional problems for Karachi's overtaxed health care facilities.

The majority of health related issues for both communicable and non-communicable disease are basic in nature. A public awareness campaign through all forms of media, meetings and events is needed to increase population awareness of key health and environmental issues. People need to know more about potential diseases, what to do about them, and where they can be treated. At the same time, efforts to improve the health care system must also be coordinated with health education, improved water supply, sanitation and solid waste collection, improved food quality control, population planning and inoculation against disease.

Public Health System facilities in Karachi include:

1. Outreach and community based activities that focus on immunization, malaria control, maternal and child health, family planning and the Lady Health Workers program.
2. Primary care facilities that focus on outpatient care.
3. Taluka and district headquarters hospitals for basic inpatient and outpatient care.
4. Tertiary care hospitals; and
5. Teaching hospitals and centers of excellence.

Major deficiencies exist in both the quantity and quality of these public health care facilities. The current system has 33 hospitals, 271 health centers and 152 dispensaries. It includes and estimated 15,000 beds, of which 9,000 are in the tertiary and teaching hospitals and the remaining 6000 dispersed among the primary and secondary facilities. The ratio of beds to people is 1 to 1700 in the tertiary and teaching hospitals and 1 to 1020 for all public health facilities. The private health care system has 356 hospitals (of which 145 are large), 391 maternity homes, 2,347 dispensaries and about 6,600 beds.

Requirements for the year 2020 indicate the need for more than 2,000 public health care facilities, many of which will be primary and secondary level health centers, and 52,000 beds, based on standard ratio of 1 bed for 500 people.

The maintenance of buildings, medical equipment and vehicles is not properly funded nor managed and has become a major problem at the primary and secondary levels. Considerable budgetary savings could be achieved if funds were made available and maintenance done in a timely and proper manner.

There are 4,600 registered doctors and 10,739 public and private sector health care workers active in the city. The National Planning Commission has set a standard of 1 health care worker per 1,000 people, which translates into a requirement for at least 25,000 health care workers by the year 2020. By that time, the number of health care workers will need to more than double with an increase of some 15,000 workers. This includes nurses, paramedics, medical technicians,

pharmacists and other technologists. There is also an urgent need for trained health care managers who can deploy existing health care resources in an effective manner. Much of this type of management, including referrals, currently is being done by doctors who are not trained in the art of delegating services to different levels and / or members of the health care system. At present, there is no well-defined policy on human resource development or in-service training opportunities that would enable health care workers to upgrade their skills.

Many people in Karachi either do not use public health facilities at the primary level. They do not use health facilities at all or prefer to go to private ones. If they do use public facilities, they try to attend the larger hospitals, even for minor ailments that could be treated more effectively at the primary or secondary levels. Hospitals are overburdened as a result of this situation and the cost of delivering simple services is increased.

This problem is due in part to the inequitable distribution and poor geographic location of many primary health facilities. Most of these centers are housed in run down buildings that operate for only a few hours per day. Many are also deficient in female staff and basic medicines. The quality of care they provide is highly variable, but generally perceived to be poor.

Funding for new and improved health care services is inadequate. While health care funding has increase from Rs 9,257 million in 2004-2005 to Rs 12,885 million in 2005-2006, its percentage of the budget has remained at 28-29 percent. Administrative devolution has empowered CDGK as an important financial intermediary that will need to account for 60 percent of the total government health expenditure in its budget. The regularization of user fees within the total health care delivery system will be important for the overall sustainability of the system.

Finally, the city's emergency and ambulance system needs to be improved. At present, the Edhi system is the only organized system able to provide efficient health transport and work with first responders trained to provide initial treatment.

Although the access to the public sector hospitals is unrestricted and is generally non-discriminatory, the treatment and hospitalization facilities are lacking so that there is considerable pressure on the present resources. In contrast, the private hospitals which provide better facilities and service but restrict access on account of affordability. Such facilities are not currently available, like the areas of North Karachi, Orangi Landhi, Korangi and Bin Qasim.

1.3 SWM in Karachi

The performance of solid waste management system has always been a major cause of concern, as this municipal service was traditionally less attended in such basic aspects as primary collection of garbage and safe transfer to the landfill sites.

Approximately 9,000 tons per day of municipal solid waste is generated in the city (2005). This waste includes domestic, commercial, construction and demolition waste, industrial and other mixed waste. Often hazardous and non-hazardous healthcare waste is also being disposed in municipal waste stream due to non-awareness and lack of monitoring. The amount of solid waste is expected to substantially increase with the rapid growth of population, changing life styles and

economic activity. By the year 2020, the solid waste generation may reach 16,000 to 18,000 tons per day, which needs to be collected, transported and appropriately disposed. The quality of civic life is closely related and affected by the sanitary conditions in the residential neighbourhoods and other areas, where efficient collection of garbage is the key to clean and healthy environment.

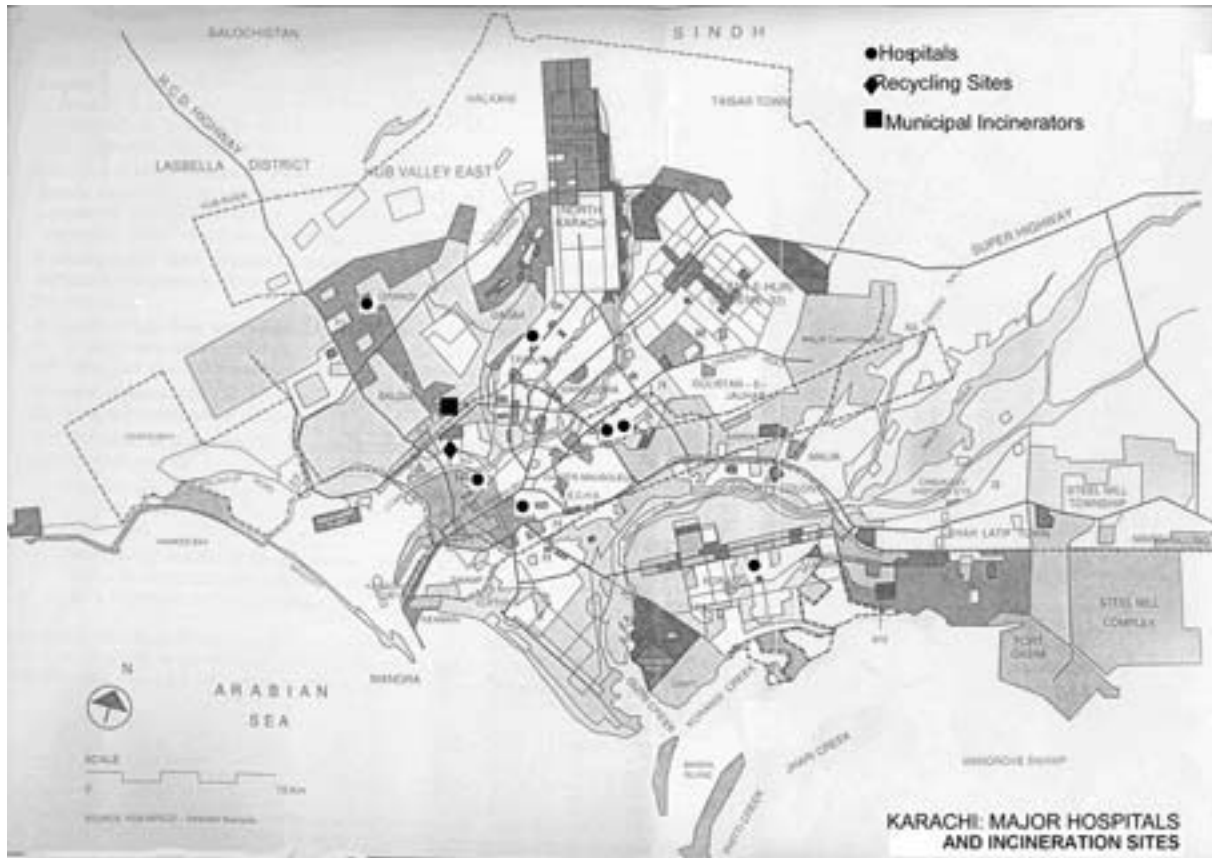
It is important to effectively organize primary collection of garbage, that is from the households (within the Union Councils) and locations of origin / generations such as markets, industrial areas, hospitals and recreational places. The city conspicuously lacks garbage transfer stations which need to be developed for better handling of the garbage and transfer to sanitary landfills. Poor planning, inappropriate technology and poor management are obviously the main areas of concern needing serious efforts on the part of the local government and other agencies towards efficient management and modern technological development of this sector.

1.4 Important Issues

There are several issues that affect the overall performance and service delivery level of SWM sector in the city. They are outlined as under:

- (a) Due to changing life style, the quantity of waste generation in the city is increasing fast. Advent of local and multi-national franchises of various consumer goods use different forms of packing material which adds to the waste stream. Rise in population contributes to an overall rise in the proportion of waste that is generated as a normal process. The addition of new products such as mobile phones, multifarious electronic goods, computers and accessories are also a source of increase in the waste volumes. Observations and site visits have shown that the trend is moving in an ascending direction.
- (b) Frequent institutional re-vampings pertinent to social waste management system have adversely affected the capacity and output of SWM. During the 1980s, the system was largely de-centralised where area municipalities were responsible for the various stages of waste collection and disposal works. After a comprehensive analysis of the sector, it was centralised with the creation of a Solid Waste Management (SWM) Department under the control of the Karachi Metropolitan Corporation (KMC). With the inception of devolution plan, the service was decentralized at three levels. At the Union Council level, sweeping and household collection work was delegated. The storage and disposal to the dumping sites was assigned to the town level. Management of landfill / dumping sites was made the responsibility of City District Government of Karachi (CDGK). In this institutional change over, the capacity of the sector has been severely eroded due to abrupt distribution of hardware / equipment, transfers of staff members, human resource inadequacies, confusion in jurisdiction, paucity of resources (that developed at intermediate level) and the overall loss of a coherent management approach experienced after the recent change. According to recent news reports, the local government system will be revamped again shortly. An impact will obviously arise on the solid waste management (DAWN, 2008).
- (c) New types of waste have now been generated for which no preparation and capacity is available for management. This includes electronic waste, junk computers and circuit

- boards, semi-liquid waste (produced during cleaning of trunk sewers and open drains in large quantities) and construction waste of varied composition.
- (d) Unattended waste of various kinds and related material is contributing to the spread of contagious diseases some of which are extremely hazardous. Outbreaks of malaria, cholera, gastro-enteritis, hepatitis etc are routinely spread due to factors of stagnant wastewater and solid waste heaps all around the city. The trend is on the rise. Healthcare waste has a significant role to play in this respect. Scientific studies are needed to establish the exact correlation between healthcare waste and diseases outbreak.
 - (e) The city is devoid of organized spaces for temporary storage and properly designed landfill sites. On certain occasions, the CDGK had announced the creation of designated transfer stations however it has not been properly implemented in any town of the city. Amenity plots – designated for other land uses – have been earmarked for adhoc temporary storage waste at neighbourhood level. Due to unplanned nature, they cause severe environmental harm to the adjoining residents.
 - (f) SWM has become a very expensive service due to exponentially rising fuel prices. The CDGK is finding it extremely difficult to manage the service under high price regime in the country. The service does not receive any taxation support which increases the financial pressure on the CDGK management to extend this service to a largely non-paying clientele.
 - (g) The level of awareness amongst the masses in general and staff in particular about the core issues of waste management is assessed to be low. As a consequence, major lapses in collection, transportation and disposal have been observed. Inability to ensure the use of protective gear for sanitary staff, rampant burning of waste at neighbourhood locations / dumping sites, use of open trucks for waste disposal, indiscriminate dumping without safety precautions and mixed handling of municipal / hazardous / healthcare waste are some critical areas.
 - (h) SWM does not surface as a high priority for CDGK as it is not a municipal work that generates political dividends. Thus, instead of investing in this service, the municipality prefers to concentrate on developmental projects of high visibility.



CHAPTER 2 STATUS OF HEALTHCARE WASTE MANAGEMENT

2.1 General

World Health Organization (WHO) defines HCWM as the total waste stream from a healthcare establishment, research facilities, laboratories and emergency relief donations. It may be pointed out that HCWM is also influenced by the local parameters of relevant contexts in the larger perspective. The level of waste management, environmental conditions, degree of general sanitary conditions and social habits / literacy levels. The response to the challenges of HCWM becomes effective wherever the target population is well versed and aware about the potential hazards associated with different categories of waste. Conversely, the task becomes difficult where this awareness level is low. HCWM comprises several waste streams, some of which need a more stringent care and disposal.

2.2 Categories of Healthcare Waste Management

Literature and studies on the subject have identified several categories. The same have been described in the TOR of this study and are mentioned hereunder.

Healthcare Waste is defined as the total waste stream from a health care establishment, research facilities, laboratories, and emergency relief donations. HCW includes several different waste streams, some of which requires more stringent care and disposal:

Communal Waste is all solid waste not including infectious, chemical, or radioactive waste. This waste stream can include items such as packaging materials and office supplies. Generally, this stream can be disposed of in a communal landfill or other such arrangement. Segregation of materials which are able to be reused or recycled will greatly reduce the impact burden of this waste stream.

Special Waste consists of several different subcategories:

- *Infectious*: Discarded materials from health-care activities on humans or animals which have the potential of transmitting infectious agents to humans. These include discarded materials or equipment from the diagnosis, treatment and prevention of disease, assessment of health status or identification purposes, that have been in contact with blood and its derivatives, tissues, tissue fluids or excreta, or wastes from infection isolation wards. Such wastes shall include, but are not limited to, cultures and stocks; tissues; dressings, swabs or other items soaked with blood; syringe needles; scalpels; diapers; blood bags. Infectious material from nursing homes, home treatment or from specialized health-care establishments which do not routinely treat infectious diseases (e.g. psychiatric clinics) is an exception to this definition and are is not considered as infectious health-care waste. Sharps, whether contaminated or not, should be considered as a subgroup of infectious health-care waste. They include syringe needles, scalpels, infusion sets, knives, blades, broken glass.
- *Anatomic*: consists of recognizable body parts.
- *Pharmaceutical*: consisting of / or containing pharmaceuticals, including: expired, no longer needed; containers and / or packaging, items contaminated by or containing pharmaceuticals (bottles, boxes).
- *Genotoxic*: Consisting of, or containing substances with genotoxic chemicals.

- *Chemical*: Consisting of, or containing chemical substances, including: laboratory chemicals; film developer; disinfectants expired or no longer needed; solvents, cleaning agents and others.
- *Heavy Metals*: Consisting of both materials and equipment with heavy metals and derivatives, including: batteries, thermometers, manometers.
- *Pressurized containers*: Consisting of full or empty containers with pressurized liquids, gas, or powdered materials, including gas containers and aerosol cans.
- *Radioactive materials*: Includes unused liquids from radiotherapy or laboratory research; contaminated glassware, packages or absorbent paper; urine and excreta from patients treated or tested with unsealed radio nuclides; sealed sources.

2.3 Origins and Sources of Healthcare Waste

There are several ranges of health care facilities and establishments that are the origins of HCW. A broad list includes hospitals of various scales, consulting clinics of general practitioners and specialists, diagnostic laboratories, basic health units, maternity homes, dispensaries, blood banks, specialist establishments (such as plastic surgery hospitals, cosmetic surgery clinics, dermatology centres), informal midwifery centres (located especially in squatter settlements and indigenous / traditional health centres). In terms of proportion of waste, the teaching hospitals constitute the most important category, which generate multiple types of wastes of various types and quantities. According to a study, about 75 – 90 percent in non-risk while only 10 – 25 percent is infectious and needs proper treatment. However, no distinction is made neither at the stage of collection nor at the subsequent stages of storage and disposal (Habibullah and Afsar, 2007).

CHAPTER 3 LEGISLATIVE AND REGULATORY FRAMEWORK

3.1 Legislative and Regulatory Issues – A Review

There is a reasonable heritage of legislation applicable to HCWM in the country. Pakistan Environmental Protection Ordinance 1997 is probably the most comprehensive statute that also governs the healthcare waste management domain. It assigns extraordinary status to HCW however poor implementation has become a major concern. The matter has been repeatedly reported and analysed through media reports, documentary films and awareness seminars by the press, though it has not received the due attention of healthcare authorities or the municipal staff responsible for the task. Probably rampant corruption in the process of monitoring and subsequent corrective action has become the major cause for this ongoing inaction in the state of affairs. Also the overall dismal status of municipal waste management does not leave enough initiative for the relatively smaller volume of HCWM service to be dealt in its rightful priority.

3.2 Existing Legislative and Regulatory Framework

Between the previous decade and present situation, the legislative and regulatory framework has marginally improved. The amended version of Pakistan Environmental Protection Ordinance (PEPO) has been the key statute that provides legal umbrella cover to activities of environmental management including HCWM. The law attaches significant importance towards the strict compliance with National Environmental Quality Standards (NEQS). In addition, the Federal Ministry of Health issued HCWM Guidelines in 1999 with an advice to all the facilities for compliance of the same. The Ministry of Health has also issued Health Care Waste Management Rules 2005 which encompass the major domains of HCWM. It is disappointing to note that they are not followed by the health care establishments with very few exceptions. The ancillary laws and controlling authority towards HCWM include Pakistan Penal Code (PPC) 1960 where negligence towards poisonous, toxic and hazardous waste is an offence. At the provincial and district / city level, the Sindh Local Government Ordinance (SLGO) 2002 extends the responsibility of solid waste management to the district governments and its subordinate tiers. As discussed earlier, drastic changes in laws and applications are anticipated which will have implications on the waste management services also.

3.3 Institutional Architecture in Healthcare Waste (HCW)

Four types of stakeholders can be identified with respect to HCWM in Karachi. They include legislative / regulatory, administrative monitoring (from civil society perspective) and service providers at the formal and informal level. The government had constituted several environmental tribunals to look into the disputes and conflicts pertinent to environmental affairs, including HCWM. These tribunals were not effective in controlling the violations of regulations due to several reasons. In many instances, the government itself was a violator of environmental statutes. In other cases, the private or commercial interests were overwhelmingly strong. Thus they succeeded in delaying the judicial process to their advantage. In one instance, a public service litigation was filed by a lawyer related to the alleged dubious usefulness of incinerators in hospitals. The petitioner contended that burning of hospital waste generated Dioxin substances

which are harmful for public health. The case was filed on 04 February 2008 in the High Court of Sindh Province and is still pending.

In the administrative respect, the CDGK is the key agency responsible for collection and disposal of HCW. It has hired the services of a waste collection / management firm although the number of hospitals connected to the service are very few. At present, 10 teaching hospitals and 130 small hospitals hand over the waste to the private Contractor while a large number of HCF avoid to link up due to financial reasons. Lack of awareness and fear of external control by the regulatory agencies are two principal concerns amongst the managements of hospitals and healthcare facilities. The general regulatory duties on environmental management are assigned to Sindh Environmental Protection Agency (SEPA). It is also responsible for advising the departments / units for conduct of Environmental Impact Assessment (EIA) and Initial Environmental Examination (IEE). So far this rule has not been applied to HCWM. The jurisdiction of SEPA also extends to HCWM in respect to the installation and operation of incinerators, collection and disposal of waste and overall management of infectious waste. However no worthwhile response has been evidenced from this regulator towards the issues of waste generated from the healthcare stream.

The monitoring of the sector is performed by non-governmental organizations (NGOs), media and professional bodies. They have been instrumental in highlighting the gravity of the situation as and when it arises. For instance, many senior members of Pakistan Medical Association (PMA) – a professional body of medical doctors – have been very active and vocal about the status of HCWM. Through briefings, seminars and workshops, they have apprised the hospital managements and concerned government departments about the potential threats emanating from poor practices in HCWM. PMA also encourages independent research in the domain of healthcare waste. Some of these works have also been published in its journals. SHEHRI (Citizens for Better Environment) is an NGO active in all the sectors of SWM including hospital and hazardous waste. It has undertaken several studies pertinent to this sector and promoted the findings through seminars and publications. Society for Conservation and Protection of Environment (SCOPE) is another NGO which collaborated with the government on a number of assignments pertinent to training of staff members, capacity building and awareness raising on issues of HCWM. It has also done detailed case study analysis of selected hospitals during the late 1990s. The print and electronic media has been actively covering the issues of HCWM from journalistic perspective. Many news reports articles and documentary films have been prepared and carried by the media on a regular basis. In many instances, media reports have caused some concern and later actions by the respective government departments.

Service providers is a very small category in this domain. It includes the dealers / importers of HCWM accessories / equipment and contractors that provide health care waste management services to the municipal agencies. At present, M/s Abaseen International are the lead contractors that are extending multi-farious waste management services to CDGK that include import of vehicles and equipment, landfill site management and HCWM. The firm faces a number of problems such as non-cooperation amongst the ranks of the concerned officials / staff of municipality, non-availability of service spaces for parking vehicles / containers and inability of the municipality to enforce the hospital waste management guidelines issued by Ministry of Health. It is also important to note that since HCWM is a very high risk sector of business, there

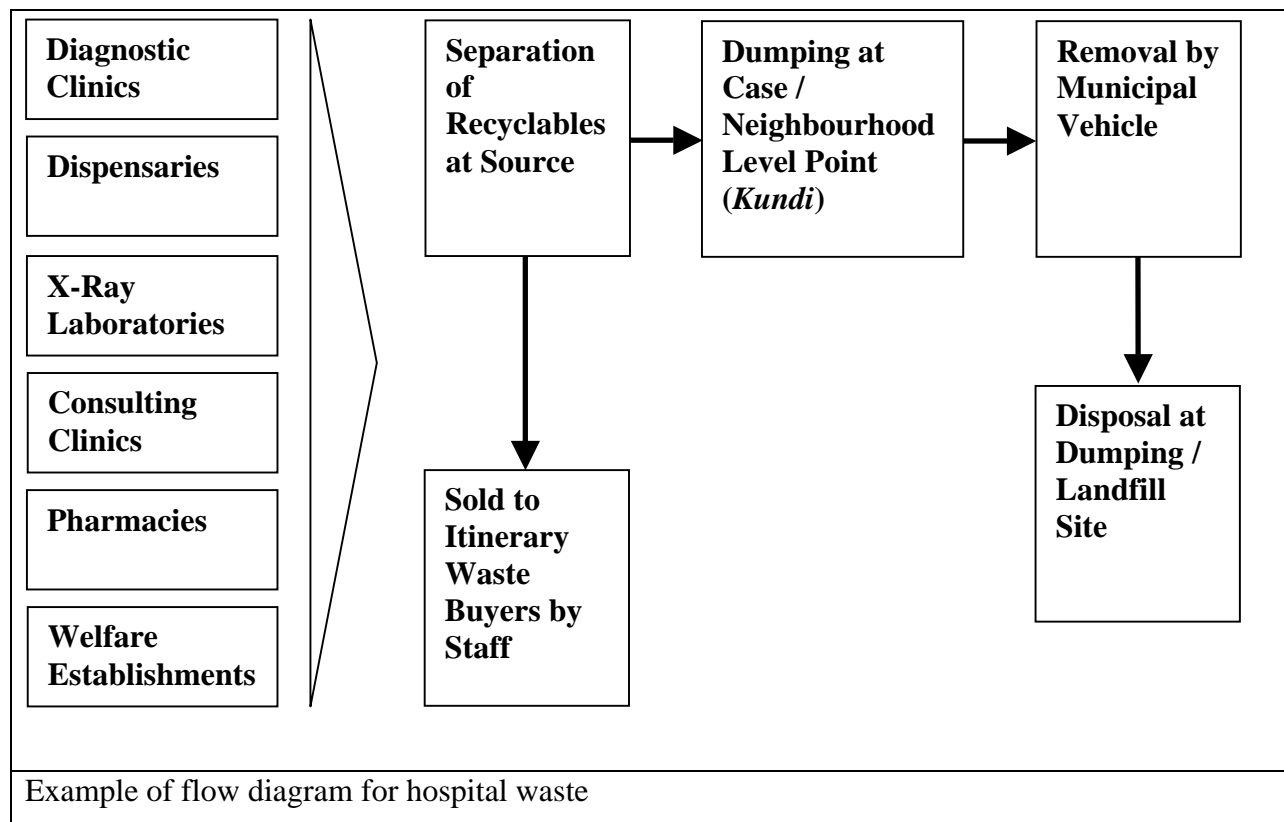
is virtually no incentive for the other contractors to enter the field. Informal waste dealers, pickers and middle men constitute other actors in this activity. With the exception of collectors and re-cyclers of non-hazardous hospital waste, the remaining categories of work are extremely dangerous due to non-applicability of occupational hazard prevention codes.



CHAPTER 4 HEALTHCARE WASTE MANAGEMENT IN KARACHI

4.1 Healthcare Facilities and Waste Generations

The Healthcare Facilities in Karachi are of various types, other than hospitals which are dealt in this report separately. The commonly existing categories of HCF include dispensaries, Basic Health Units (BHU), diagnostic laboratories, consulting clinics, pharmacies, medical stores and welfare establishments providing healthcare services of some kind. They are spread out across the city without any consideration of zoning or locational regulations. In their usual operations, they generate different types of waste, which is outlined in section 2.2. The disposal of this waste has been found to follow same practices as the usual municipal waste. A typical flow diagram is given below as under:



4.2 Waste Management Practices in HCF

4.2.1 Basic Health Units (BHU)

The BHU is the most basic unit in the HCF hierarchy. It is a composite structure comprising a consulting space, dispensary, beds for resident patients (in sub urban locations) and ancillary spaces. Being a free healthcare facility, it generates a large number of patients per day. The waste generated during these activities comprises used bandages, gauzes, swabs, bottles, used

syringes, drip injections, catheters, tissue papers etc. The BHU normally has plastic buckets for in-house collection of these materials. The main recyclable material is separated by the junior staff members for selling to waste buyers. The infectious materials such as syringes are also sold with the other related items. The non-saleable waste is disposed in a similar manner as the municipal waste. It may be noted that the organic waste so disposed is of highly infectious nature, which mixes with municipal waste and remains exposed for extended periods of time. The neighbourhood during points and landfill / dumping sties become potentially hazardous sites due to indiscriminate dumping / spreading of these materials.

Table 1 Solid Waste Composition and Future Estimates

No.	Type	2005 (estimates in tones)	2020 (projections in tones)
1.	Organic	4950	8800
2.	Inert	450	800
3.	Recyclable	1350	2400
4.	Infections (suitable for incineration)	6300	1120
Total		9000	16000

Source: Based on Karachi Strategic Development Plan Assumptions (2007)

Table 2 Karachi: Health Sector Fact Sheet

Facility	Number
Hospitals (in public sector)	33
Hospitals (in private sector)	356
Health Centre (public sector)	271
Dispensaries (public sector)	152
Dispensaries (private sector)	2347
Maternity Homes (private sector)	391
No. of beds (2005 estimates)	21600
No. of beds (2020 requirements)	52000

Source: Based on Karachi Strategic Development Plan 2020 (Prepared in 2007)

A recent study on HCW covered the entire city from the perspective of knowledge – attitude participation baseline in the public sector hospitals. 15 towns in Karachi were targeted as per following table:

Table 3 Health Facilities Surveyed

Name of Town	Facilities Selected	Data Collected	Data Not Collected
Kiamari	7	3	4
Site	4	2	2
Baldia	2	NIL	2
Orangi	3	3	NIL
Lyari	5	4	1
Saddar	11	10	1
Jamshed	6	4	2

Gulshan	4	2	2
Shah Faisal	3	1	2
Landhi	3	2	1
Korangi	3	3	NIL
New Karachi	3	2	1
Gulberg	2	2	NIL
Liaquatabad	8	7	1
Malir	4	4	NIL
Total	68	49	19

Source: Habibullah and Afsar (2007)

Different quantities of waste was produced with varying frequency of disposal:

Table 4 Health Care Facilities Waste and its Disposal

<i>Amount of Waste Produced</i>	<i>No. of Health Care Facilities</i>
1-10 KG	41 (83.67%)
10-20 KG	3 (6.12%)
21-100 KG	5 (10.21%)
<i>Disposal of waste / 24 hours</i>	
Once per 24 hours	30 (61.22%)
Twice per 24 hours	7 (14.29%)
Three times per 24 hours	12 (24.49%)
<i>Place of disposal</i>	
Public dustbins	35 (71.425%)
Dumping in soil	1 (2.04%)
Incinerator	4 (8.16%)
Burning	9 (18.38%)

Source : Habibullah and Afsar (2007)

The results of this study suggested drastic improvements (Habibullah and Afsar, 2007).

4.2.2 Consulting Clinics (CCs)

These facilities exist in multiple formats. In certain cases, CCs are part of the hospital scheme. In such case the waste management of CCs is linked to the overall collection and disposal system of the hospital. The other and more common format of consulting clinics is along independent locations. In this form, an individual doctor or a panel sits in a unit with a waiting space, examination room, small storage space and supplies room. The wastes generated during the operation of the Consulting Clinics comprise used syringes, used medicine bottles, bandages and plasters (in case of orthopedic clinics etc), paper waste and X-ray films. Much of the material

generated from the consulting clinics is re-cycled and separated by the janitors / junior management staff of the CC.

4.2.3 *Laboratories and Diagnostic Establishments*

Pathological and radiology labs are two dominant categories of this facility. The types of waste generated in pathological labs comprise specimen of excreta / body fluids, bandages, syringes, swabs and linen shreds. In addition, a significant amount of highly infectious liquid waste is generated which is mixed with routine sewage without any kind of treatment. The solid waste is divided into re-saleable and non-saleable entities. The saleable articles are separated at source and sold to waste buyers. The organic waste is disposed with the regular municipal waste. In case of radiology labs, used X-ray films are the most attractive item which are burnt to produce small amounts of precious metals that fetch some revenue. This waste is disposed with the normal municipal waste stream.

CHAPTER 5 HOSPITAL WASTE MANAGEMENT IN KARACHI

5.1 General

Hospital waste management encompasses the process of collection, in house storage, transportation, disposal and end stage treatment of all types of healthcare refuses from healthcare waste materials. It also includes the procedures of separation of general waste from health care waste to enhance the efficiency and effectiveness of health care waste systems. As per common observation, no effective healthcare waste management system exists in the country in general and Karachi in particular. Few basic attempts have been made by some units of the concerned authorities. However the situation is far from satisfactory. This scenario is a cause of direct health risk to hospital staff, municipal sanitary workers as well as general public. It may also be pointed out that the dangers of the spread of disease from the misuse of discarded syringes and the handling / re-sale / re-packaging of infected material is one of the core causes of concern in respect to potential spread of diseases. The sector is in serious need of appropriate policy formulation response, preparation and application of Standard Operating Procedures (SOPs) and continuous monitoring / evaluation for periodic improvement of the various components of the system.

According to a study done in Karachi on the sample of eight teaching hospitals, the general status of HCWM was below desirable level. Only two of the eight hospitals had figures for waste generation. Other types of malpractices included non-existence of waste bins in the wards / bed side spaces, unchecked littering of waste by patients and others in the hospitals premises, usage of wheel chairs / stretchers / ambulances for waste transportation and absence of noted storage points. Some of the findings are mentioned in the tables below:

Table 5 Techniques Used in the Handling of Waste in the Teaching Hospitals of Karach

<i>Techniques</i> (n = 8)	<i>Yes</i>		<i>No</i>		<i>Std. Error of Proportion Presence</i>	<i>P Value</i>
	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>		
Segregation at source	2	25	6	75	0.1530	<0.05
Colour coding	2	25	6	75	0.1530	<0.05
Sharps segregation	2	25	6	75	0.1530	<0.05
Record of waste generated	2	25	6	75	0.1530	<0.05

Table 6 Waste Handling Safety Measures and Disposal

<i>Safety Measures</i> (n = 8)	<i>Yes</i>		<i>No</i>		<i>Std. Error of Proportion Presence</i>	<i>P Value</i>
	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>		
Protective gears for waste handlers	2	25	6	75	0.1530	<0.05
Appropriate internal transportation vehicle used	2	25	6	75	0.1530	<0.05

Proper storage facility before disposal	2	25	6	75	0.1530	<0.05
Use of incinerator	6	62.5	3	37.5	0.1711	<0.05

Source: Rasheed, S. (2005)

Table 7 Administrative Aspect of Health Waste Management

<i>Administrative Responsibilities</i> (n = 8)	<i>Yes</i>		<i>No</i>		<i>Std. Error of Proportion</i>	<i>P Value</i>
	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>		
Existence of HWMT	2	25	6	75	0.1530	<0.05
Trained HWM Personnel	1	12.5	7	87.5	0.1169	<0.05
HWM Duties in Job Description	1	12.5	7	87.5	0.1169	<0.05
Training of Newly Appointed Staff	1	12.5	7	87.5	0.1169	<0.05

HWMT = Hospital Waste Management Team

HWM = Hospital Waste Management

Source: Rasheed, S. (2005)

The study has laid greater emphasis on improving the management and human resource dimension of HCWM in the city on an urgent basis (Rasheed, S. et.al., 2005).

5.2 Case Studies

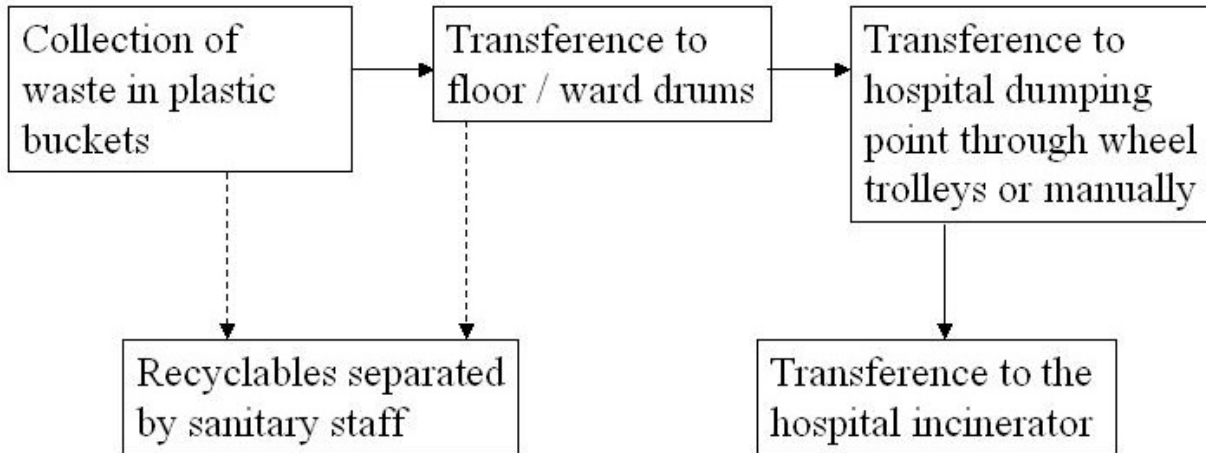
The following are the case examples from HWM practices covered in this study:

5.2.1 Civil Hospital, Karachi

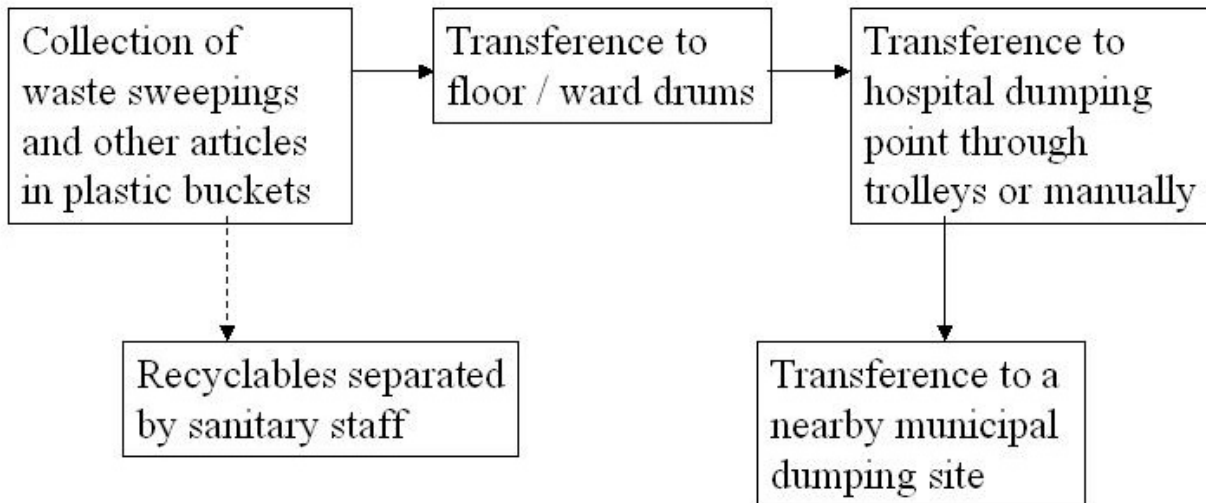
It is one of the largest public sector health care facility in the city. Presently, the hospital is composed of 1800 beds in 40 departments in medical, surgical, intensive care and other domains. Being a teaching hospital in association with Dow University of Health Sciences, it is a key facility that extends healthcare services mainly to lower middle and poor sections of Karachi and also patients pouring in from other parts of country.

The prevailing waste management system is run by a team of sanitary workers, supervisors and management officers. A basic flow of the system can be as follows:

(IN PATIENT UNITS)



(OUT PATIENT UNITS)



As reported and surveyed during the study, the commonly found waste items included syringes, drips, canola chambers, surgical tapes / dressing material, orthopaedic dressing rejects, needles / butterfly equipment, injection disposals, X ray, rejected chemical plasters, cadmium batteries, cotton sanitary pads, placentas, blood bags, urine bags, colostomy bags, plastic tubings, stomach tubings, disposable gloves, bottles of plastic and glass and other similar articles. A sizable part of liquid waste generated during operations and other functions of the hospital is disposed in the normal drainage / sewerage channels.

There are about 350 sanitary workers / sweepers who are working on the governments payroll. In the waste management work, the operating staff also participates and assists the sweepers in collection and disposal of waste. They include male nursing staff ward supervisors and ward incharges under the overall management control of Additional Medical Superintendent (Waste

Management). The staff functions in three shifts of eight hours each. They are assigned different duties such as sweeping, collection of ward waste, transportation of waste at different stages and special duties in the operation theaters, intensive care unit wards and special wards. The hospital has also hired private sweepers in certain units such as Sindh Institute of Urology and Transplantation (SIUT), Cardiac surgery and pediatric emergency units. The hospital management has developed a large dumping site for the hospital waste. With the exception of ward waste that is transported to incinerator, the remaining waste is stored in this dumping point from where a CDGK refuse van collects and disposes this material to the municipal landfill site. It is a major cause of the spread of infections. At times, the ward sweepers also dispose the regular ward waste to the dumping site, which creates a very hazardous situation.

The other units that generate waste comprise hospital kitchen and laundry. In the kitchen, both organic and inorganic waste is generated which is disposed in the usual municipal waste stream of the hospital. The laundry makes use of detergents and washing chemicals. Its packing material is the main waste item which is also disposed in the municipal stream.

One of the items separated for recycling comprise X ray films. There are about 1000 films that are rejected on a daily basis from different units of radiology. The hospital also deals with police / medical – legal cases where a large number of X ray films are produced for record keeping. In a clandestine manner, the hospital staff collects these films and privately sells them to junk dealers. The Burns Unit of this hospital is another unique facility. It is the only such facility of its kind available in the entire city. Due to the special nature of care / treatment, a sizable proportion of bandages / gauzes and cotton refuse is produced in this ward, much of which is sent for incineration. The interview of Additional Medical Superintendent is presented in the Box.

Capt. Dr. Safdar Awan
Additional Medical Superintendent (AMS) HWM
Civil Hospital Karachi (CHK)

According to the administrative arrangement, CHK has assigned the tasks related to HWM to an AMS of the hospital. Other staff members include steward supervisors, sweepers and maids. The staff working on the incinerator facility is separate from this allocation. A system has been worked out to deal with the waste management in the CHK that applies to all units and wards. The waste has been classified into three categories including infectious waste, non-infectious waste and ordinary solid waste. Three types of bags are provided to each ward with color codes. The red bags are kept for infectious waste, yellow bags for non-infectious materials including shapes of all kinds and blue bags for ordinary solid waste. The incinerator staff visits different wards during morning and evening shifts to collect the waste material. Ordinary solid waste is disposed to the local collection / storage point of the hospital from where the municipal refuse van collects it to dump it at the urban dumping site.

The infected and non-infected waste is put into the incinerator for incineration. Ashes from the incinerator are disposed at the local collection / storage point of the hospital. The temperature inside the incinerator is kept at such a high degree that even the needles also melt down. We have tried to extend the services to private hospitals at reasonable rates however not much success was attained in this respect. We only receive waste from Lady Dufferin Hospital to the tune of 40-50 Kg daily for which a nominal fee is charged.

No separate budget has been received from the government in respect to hospital waste

management. In order to generate basic funds, we charge one rupee per patient from the visiting out patients. In a way, this is the internal fund of the hospital. X ray films and waste have a certain re-cycling value however there are many exaggerations often quoted by certain actors in this field. We also receive blood bags that are incinerated as a normal practice. In CHK, no private institution is providing any kind of service. Kitchen waste is disposed in the local collection / storage point.

5.2.2 Sindh Government Hospital, Korangi No. 5, Karachi

The Sindh Government Hospital at Korangi No. 5 serves the neighbourhoods of Landhi / Korangi. Being a public hospital, it extends free medical services to area residents. The hospital is a useful facility for the low income localities of Sherpao Colony, Labour Square, Korangi, Quaidabad, Landhi and Malir.

The daily number of out patients visiting the facility is 2,000 while about 500 patients are daily brought to the emergency section of the hospital. Pediatric diseases, asthma, high blood pressure, respiratory disorders, heart patients, cases of accidents, renal diseases and infectious ailments are some of the common place problems dealt at the hospital.

A gynaecology / obstetrics ward is also working in the hospital. Vaccination services and dialysis unit are also important ingredients of the hospital infrastructure. The hospital has 200 beds capacity which is normally utilized to the full. 350-400 operations and procedures are carried out on an average every month. A kitchen unit is attached to every ward, which serves the respective patients. Conditions of general up keep, especially cleanliness and sanitation, were found to be below desirable level.

The hospital does not possess any organized waste collection system. This issue has neither been realized by the hospital management nor by any outside agency. As discussed earlier, a sizable amount of waste is generated each day due to the normal working of the hospital. For routine work of sweeping, mopping and lifting of ward bins, 30 sweepers have been appointed under the overall supervision of a steward. The staff informed that a special refuse collection van used to pick up the hospital waste some three years ago but that service has been discontinued ever since apparently due to disinterest of the government. The waste is now ordinarily dumped at a neighbourhood storage point. The sweepers withdraw all the recyclables etc for onward sales to the junk dealers. The drug addicts can be spotted sifting through the garbage in order to recover needles or any other saleable material. Some of the infected / solid waste material that is routinely generated include catheters, canola tubes, disposable gloves, ETT tubes and wastes from renal units. All of this material is disposed at the local dumping point. Placenta and blood soaked bandages / swabs are also dumped at the open dumping point.

The sweepers handle this waste without any protective gear. They do not even wear gloves while directly picking / transporting this material. Some of them complained about this issue and demanded at least the supply of long boots / gloves but the management is apparently not interested to pay any heed to this matter. They are not even vaccinated for common contagious diseases.

Liquid waste is disposed in to the hospital sewers without any kind of treatment. The hospital also produces sizable amount of kitchen / non-infectious waste which is disposed in an ordinary manner.

5.2.3 Liaquat National Hospital Karachi

Regarding hospital waste management system, I Dr. Dania Junaid visited the Liaquat National Hospital and met the concerned authority. In this hospital infectious and non infectious waste is collected separately in Red (infectious) and green (non infectious) bags.

Hospital house keeping staff collects this waste and take up to the final destination for incineration. They have their own incinerator working over there, but during this procedure there are many lacking points.

The liquid waste, which is also highly infectious, is not treated at all and directly drain into the sewerage lines. There is no proper system in practice for prior vaccination of the staff dealing with infectious waste against the infectious diseases as a result there is increasing number of the staff members who are getting infections and different diseases, like Hepatitis “C”.

The safety measures that are supplied to the concerned staff are insufficient and most of the time they are dealing with this staff without proper masks and gloves.

The incinerator also is not in a very good condition and needs repair and proper management. The ashes are disposed off openly in a near by area and not dump into the ground, while the fumes get into the environment and mix with air without any filter.

Total staff for this process is very short due to which each member is over burdened and it leads to improper and poor quality outputs. No written data was provided by the hospital management nor were any photographs allowed.

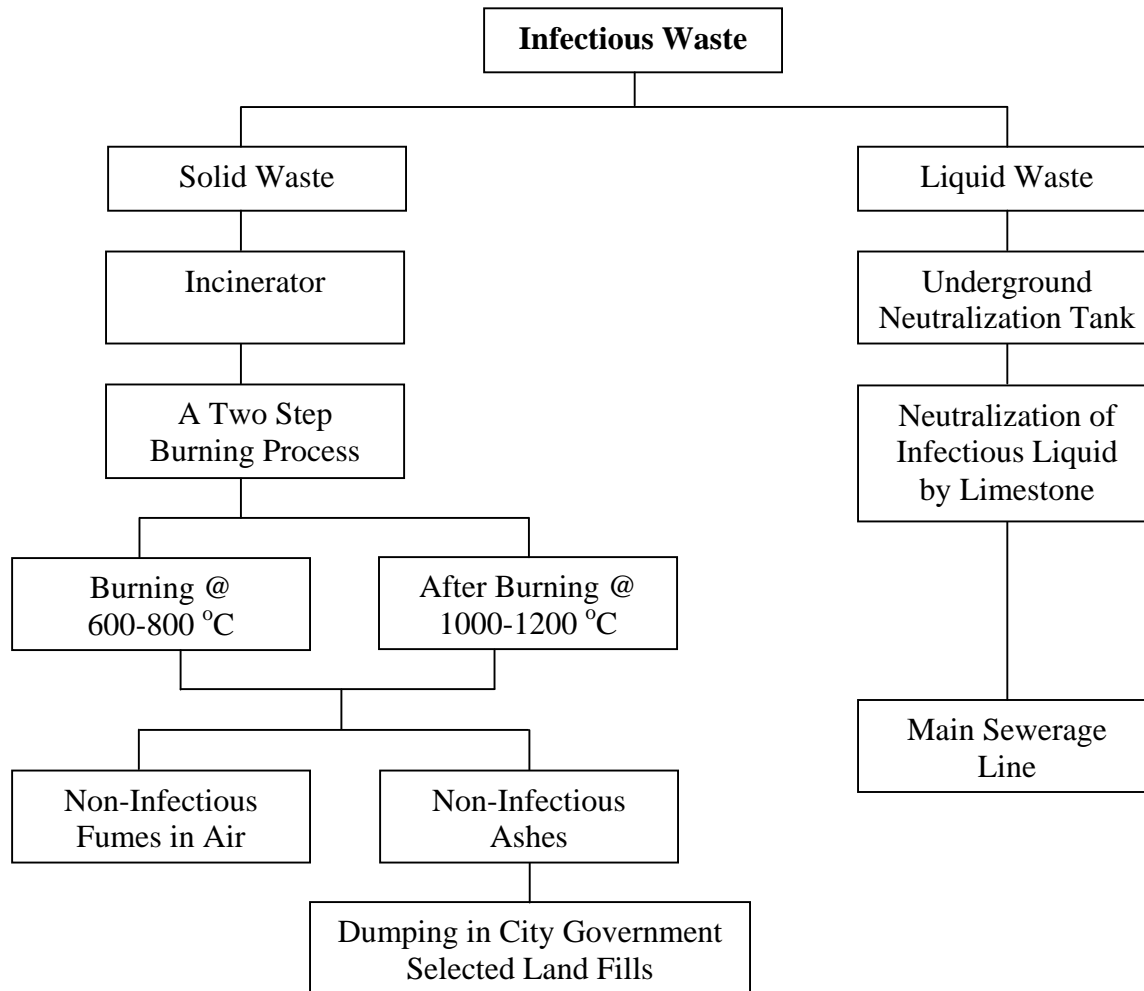
5.2.4 Aga Khan University Hospital, Karachi

Hospital waste management system is very well maintained in Aga Khan University Hospital. Segregation of infectious and non-infectious waste is done from its point of generation in the form of red (infectious waste) and green (non infectious general waste) bags.

These bags are taken to the incinerator and disposed off by the process of burning. In case of failure or non-working conditions of the incinerator, AKUH has the system of walk in freezers, which can store the waste for 2-3 days after that it is discarded properly.

For the liquid infectious waste, Aga Khan University Hospital has neutralization tank system, which is made underground and filled with limestone, a strong disinfectant. Sewerage lines from pathological laboratory and research labs drive into this tank and from here after disinfection, this liquid drains into main sewerage lines. This is a PVC lined tank about 4 feet in diameter and 8 foot in depth. Limestones are replaced and tank is cleaned after every 4-6 months.

A brief flow diagram as following can describe the Aga Khan University Hospital infectious waste management system.



5.2.5 M/s Abaseen International (Healthcare Waste Transportation and Treatment (Incineration) Facility deployed by the CDGK)

The Chief Executive of this firm was interviewed. Below is the edited version of the transcript.

In 1994, idea was floated for a central waste incineration facility. It was found useful by KMC and it floated a tender. In September 1995, this contract was awarded to us on a turnkey basis. These two units were imported from USA and installed at Mewa Shah area after a delay of three years in 1998. We operated these units for 6 months and then handed them to KMC. The KMC ran it for 1.5 years and then ran into some budgetary deficit. The KMC offered us a joint venture, which began operational since 2001. We are doing that ever since with all the components in place. Collection in purpose built vehicles, transportation and disposal are some of the key components. The ash is also scientifically disposed.

The capacity is about 1,000 kg / hour. Operating temperature is 800 °C at the primary chamber where the healthcare waste is burnt. The secondary chamber is where the gaseous matter is burnt having a temperature of 1,000 °C. Retention/ residence time of these two chambers is two seconds. They stand about 35ft from the ground level.

At one point in time, we had 250 hospitals. We developed the whole operating system ourselves. However now the number has dropped to 130. The government did not take interest in it and it was soon discovered that we do not have any authority to enforce it. The CDGK did not facilitate adequate follow up in this respect. Some of the new hospitals have come to us, may be due to their internal reasons. They include South City Hospital, Aga Khan University Hospital and Orthopaedic & Medical Institute (OMI). The problem with government hospitals is that much of the material that needs to be incinerated is often taken out of the disposal stream. We also find that much of the waste that we obtain is municipal waste and not the hospital waste in the actual respect.

The sweepers are mainly responsible for the removal of recyclables from the waste stream. One way to overcome this problem is to hire professional waste management companies. They should be allowed with multiple tasks such as segregation of hazardous waste from non-hazardous substance, collection in separate containers, etc. Only hazardous waste should be sent for incineration, while the municipal components needs to be transported and disposed to the landfill site. Contaminated and hazardous waste needs to be incinerated.

Regarding the healthcare waste disposal, the hospital staff and management have to be adequately sensitized and trained. Many serious problems have been witnessed at the hospitals. For instance, the hospitals invite the street side drug addicts to assist in waste handling. They sift through the waste because that is a source of income for them. They also pick up used syringes. The hospital management is not concerned about this issue. Another serious issue is the non-availability of disposing waste from gynae / obstetrics and orthopaedic procedures. Absence of liquid waste treatment is another shortcoming. It is disposed in the regular sewerage network ending up into the sea.

We have the capacity to manage the hospital waste produced in the city. But unless the government does not penalize the violators, the situation will not improve. Majority of the hospitals fall in the jurisdiction of CDGK. Few fall in the territory of Cantonment Boards such as South City Hospital. National Medical Centre at Korangi Road is also an example of responsible conduct towards HCW. Hospitals should try to outsource this service. CDGK should file cases against violators.

We also have thousands of laboratories, most of which generate contagious liquid waste. They also generate examination slides, which are disposed without care. Some of them are washed and re-used. HCWM does cost money but there is no comparison of cost with human life. Hospitals charge exorbitantly but are reluctant to pay for essential services. The service charge levied on an average sized hospitals is Rs 3,000/= per month which is extremely low and does not even augment for diesel cost. The large category (E category comprising 400 beds) pay 45,000/= per month but that is also much less given the volume of waste that has to be dealt. All the costs

including transportation, utility bills and salaries have to be borne by us. The charges need to be at least doubled. A list of charges is appended in Annexure-01.

Management of incinerator itself is a big issue. Improper usage can lead to very harmful effects. For instance, if the incinerator is operated at low temperatures, it can cause to incomplete burning of plastics, which is very dangerous. If it generates black smoke, then it is again a very dangerous proposition. We have observed incinerators in different parts of the country such as Lahore, Multan and Rawalpindi but the operational conditions are not satisfactory at all.

PROFILE OF HOSPITAL WASTE TREATED AT THE MUNICIPAL INCINERATORS	
Daily waste incineration	3 tonnes (approx)
Monthly waste* incineration	78 tonnes (approx)
10% are recovered as ashes and disposed at the landfill site	
* Incinerators are closed on Sundays	

Source: Interview with the staff of Abaseen International

5.3 Issues in Hospital Waste Management

An already mentioned, none of the regular hospitals have a proper waste management strategy or system. The waste from a bed is collected in the most ignorant manner and is transported to the central hospital bin in an equally defected practice. Every bed is provided with some sort of basket or a container, which very often is not capable of holding the waste which is being generated each day, before its time for the sanitary worker to empty it again.

From that basket the refuse is collected in an open handcart which crosses the whole hospital premises with its litter dropping on every jerk and jolt in verandahs and corridors, thus spreading the nuisance of this hazardous waste from a small scale to a potentially large scale.

Once the waste is brought to the central hospital bin, it becomes the responsibility of the respective municipal corporation. The trucks from these organizations regularly collect the hospital waste without any special arrangements. The loaders do not take any precautionary measures and do not use any protective clothing, similar is the case with the sanitary personnel of the hospital.

The waste collection vehicle on the other hand has shortcomings of its own. It is totally inadequately equipped and is not capable of holding the loaded waste. The material is seen very often falling while truck heads for the municipal dump, thus not only creating an unbearable smell in the atmosphere but also spraying the hazardous hospital waste on the busy roads in the peak load hours, leaving a lot of material to spark off epidemics and hazardous diseases.

The final destination of this hazardous hospital waste is either an authorized or very often an unauthorized dumping site. Even this municipality controlled waste dumpsite is not scientifically designed, and virtually everything has an easy access to the dumpsite.

It is a common scene to observe scores of families, creating tent villages all around the dumpsite / landfill. These people live on the material recovered from the dump. Livestock is also a permanent feature at the dump site, grazing on the freshly arrived organic waste from the city. The dumpsite has a 24 hour smoke loaded atmosphere.

The condition of liquid waste generated from hospitals is not much different either as, all the excretions like urine, blood, sputum etc. are drained into the normal sewerage system, which in most of the cases is choked and the gutters gush the wastewater out on the roads causing a chance of any major disease outbreak.

CHAPTER 6 ACTORS AND ENTERPRISES IN HEALTHCARE WASTE MANAGEMENT

6.1 General

There are several types of actors and enterprises associated with HCWM. Broadly referring, they can be categorized as formal actors and enterprises, informal actors and enterprises as well as administrative staff of concerned government authorities. These actors at times perform their work in violation of the basic principles of waste management mainly for the small scale profiteering. Such lapses cause grave consequences for the overall domain of public health due to unnecessary exposure of certain target groups in the public.

6.2 Formal Actors

Hospital management, diagnostic / laboratory management, waste service contractors, individual staff members, employed sweepers / sanitary workers, pharmaceutical companies, suppliers of medicines / props of hospitals, machine operators / drivers and recipients of healthcare services are some of the direct stakeholders in healthcare waste management. At times, the objectives / interests, procedure / process of working and concerns of these actors remain conflicting with one another. This can be reviewed from the following matrix:

No.	Actor	Objective	Concerns
1.	Private Hospital Owners	<ul style="list-style-type: none"> ○ To profitably run hospitals. ○ To invest in such services / avenues which generate instant financial returns. ○ To reduce operational expenses to the optimum possible extent. 	<ul style="list-style-type: none"> ○ Consider hospital waste management as an unimportant and non-profitable area to invest. ○ Find the municipal authorities and regulatory bodies as corrupt and inactive. ○ Consider hospital waste management as some one else's business.
2.	Medical Superintendents of Large Public Hospital	<ul style="list-style-type: none"> ○ Wish to manage hospitals 'smoothly' without government or media criticism on lapses such as poor sanitary conditions / HCWM. 	<ul style="list-style-type: none"> ○ Shortage of staff, funds and equipment. ○ Very low efficiency of sanitary staff. ○ Limited realization about the gravity of situation related to HCWM. ○ Very few options / systems to choose from.
3.	Medical Practitioners (Doctors)	<ul style="list-style-type: none"> ○ Treatment of patients according to available facilities. 	<ul style="list-style-type: none"> ○ Do not consider HCWM as their responsibility. ○ Have little sensitivity about the seriousness of the issue.
4.	Sanitary Workers / Sweepers	<ul style="list-style-type: none"> ○ Cleaning / sweeping of wards, offices, waiting spaces and the other 	<ul style="list-style-type: none"> ○ Maximum exposure to contagious / infectious waste. ○ Inavailability of protective gear,

		<p>areas in the hospitals.</p> <ul style="list-style-type: none"> ○ Removal of saleable articles from the waste stream for sale to itinerary waste buyers. 	<p>proper tools and equipment.</p> <ul style="list-style-type: none"> ○ Being poorly paid, they adopt risky methods to raise incomes by picking, sorting and selling re-cyclable material to junk dealers.
5.	Store Keepers / Hospital Staff	<ul style="list-style-type: none"> ○ Remove both hazardous / non-hazardous recyclable material from hospital operations / supply chains. 	<ul style="list-style-type: none"> ○ Low salaries force them to adopt these hazardous / unethical methods of waste management.
6.	Municipal Staff / Inspectors of Hospitals	<ul style="list-style-type: none"> ○ Safe disposal of waste (including HCW). ○ Enhance income through various operations in HCW. 	<ul style="list-style-type: none"> ○ Resort to corrupt practices to earn illegal income from stakeholders by unlawful use of authority. ○ Allow potential clients of HCWM not to link up with the system due to petty interests in bribery.
7.	Service Provision Firms	<ul style="list-style-type: none"> ○ Extend HCWM service to CDGK and government / private hospitals. ○ Help procure equipment and expertise. 	<ul style="list-style-type: none"> ○ Acutely affected by the corruption of municipal staff, non-cooperation of hospital management and limited awareness about HCWM services.

6.3 Informal Actors

The informal actors include:

- Itinerary waste buyers who purchase saleable hospital waste from formal actors;
- Junk dealers who purchase waste from itinerary waste buyers / hospital staff and
- Recycling enterprises of various scales and profiles that produce marketable products from the collected waste.
- Different grades of middlemen / facilitators who promote the collection and trading activities pertinent to hospital waste.

Other categories of informal actors also include drug addicts who sift through waste for needles and syringes, scavenger boys.

The recycling enterprises that absorb the re-cycling material obtained from the hospitals are an important category of stakeholders. They are located in Lyari, Lasbela and Old Town areas of the city. Most of these enterprises recycle plastic material into plastic products and raw material. They have a network connection with the collection actors including sweepers and junk dealers / small contractors who feed them with the plastic recyclables. The rates of different levels of raw and finished material are informally negotiated. Due to mutual economic interests, the informal actors develop working relationships with various sets of formal actors.

6.4 Administrative Staff of Concerned Government Authorities

This category includes senior managers of hospitals assigned the service of hospital waste management and officers of municipalities at the senior level. A profile of Dr Safdar, Additional Medical Superintendent for Waste Management, Civil Hospital Karachi is included as a box in the previous section. The key concerns of this category of actors is the overall low priority and importance assigned to hospital waste management, absence of a well structured internal system of collection in conformity with international norms and paucity of funds to deal with the issue. The senior officers in the provincial Health Department and City District Government – though realized the significance of HCWM – yet failed to raise it in the priority list of tasks. Discussions with these officers revealed that as HCWM does not carry a high priority in terms of political benefits or gains for the decision makers, therefore they do not focus on the improvement of its performance. Interestingly, some officers did not consider it as a serious issue due to the relatively small volume of HCW in comparison of the municipal solid waste and sewerage issues. They however, showed willingness to initiate any joint venture project with the assistance of international financial institutions.

CHAPTER 7 ENVIRONMENTAL IMPACT OF HEALTHCARE WASTE

7.1 General

The HCW has serious implications on the overall environment of Karachi and its surrounding region due to the serious nature of its content, spread and management. It can be said that the curative health facilities constitute a sizable health hazard which is directly proportional to their size / scale, activities and intensity of utilization. A review of the sector revealed a generally non-responsive nature of the majority of stakeholders with very limited understanding of the critical issues that affect the overall environment. Another key point of concern is the non-implementability of laws, rules, regulations and guidelines that have been formed by various agencies. For obvious reasons, HCW has not been properly facilitated, as there is no incentive or compulsion associated with the exercise.

7.2 Impacts on Environment

The analysis of scenario reveals that there are several impacts on environment due to the current status of HCWM practices.

Liquid hospital waste flows into the municipal sewerage system without any treatment. As the municipal sewerage is directly passed into the sea without even passing through the usual sewerage treatment process, the entire contagious and hazardous material enters into the marine environment. It invariably affects the marine life including edible fishes, shrimps, lobsters and crabs. The poultry feed is also prepared from the marine waste which directly affects the food chain of the citizens.

Uncovered hospital waste is disposed at the local garbage storage points in the neighbourhood. Waste pickers, scavengers, drug addicts and street children sift through these heaps in search of re-cyclables and cause harm to themselves.

In case of long stretched dumping without collection, the heaps of garbage generate leachate which contributes to ground contamination. In cases where these dumps are above the water supply infrastructures the impact becomes many folds. Pye dogs and stray cats also attempt to consume the various elements of the waste causing potential harm to the street children and street peddlers.

The disposal vans are normally uncovered. They operate on the busy roads making it a hazard to motorists, bike riders and pedestrians. In certain cases, these vans illegally dispose their waste into open *nullahs* (storm water drains) inside urban areas. This causes hazard for all the residents / occupants who dwell alongside these open water bodies. In majority of the cases, the lower income groups become most vulnerable due to these unsafe disposal practices.

There is another lot of scavengers at the dumping / land fill site that sifts through the waste. In usual cases, they also burn the garbage, which causes incomplete combustion and consequent dispersal of harmful particles to places in the vicinity. The dumping sites are also frequented by crows, kites and vultures, all of which contribute to the spread of germs / contagious matter. Again a sizable amount of leachate percolates down into the soil thus causing contamination of the ground. Some area shepherds also bring their small herbs for grazing on the small time

vegetation in some portions of the dumping sites. They become a cause of concern due to potential contribution to food chain.

The recyclers of waste material are yet another category that causes environmental impact. The various informal processes of sifting, sorting, handling, melting / burning and re-packaging have dubious outcomes. Since contagious nature of waste is not removed, the environmental implications remain intact.

Incineration is a sensitive process. It must be carried out with scientific precision and compliance with safety procedures. It has been found that the hospital staff attempts to violate these principles by burning the waste at lower than required temperatures to save on fuel / power cost. The incomplete combustion causes soot laden smoke to emanate from the top of incinerators and thus lead to environmental pollution. In certain cases, the ashes are also not well formed and these disposed in a dangerous manner on the local dump sites.

7.3 Challenges and Opportunities

The HCWM offers many challenges, impediments as well as opportunities to be covered by the respective stakeholders. They are outlined as under:

7.3.1 Awareness and Realization

The peculiar nature of HCW is not realized by the concerned stake holders especially the menial staff. It is for this reason that they indulge into highly unsafe practices without precaution. The management also does not consider it as a priority to extend the awareness about important aspects of HCW to the concerned stakeholders.

7.3.2 Information and Database

HCWM is a confidential domain about which hospitals and other establishments do not wish to share any information. Similarly they also do not generate any information or documentation for internal consumption. It is usually considered as a very difficult task to investigate into the operational affairs of HCW by any outside actor, including press and media. This leads to a situation where lack of internal facts and basic information hampers in the proper planning and assessment of the situation. With the exception of very few private facilities, the lack of record keeping practices becomes a serious handicap. Absence of realization, limited administrative capacity and financial constraints are some of the reasons that are associated with this point.

7.3.3 Implementation of Regulations

A reasonable repository of laws, statutes and regulations exist in the country. The core shortcoming is the lack of implementation in practically all respects. The generally weak environment of regulatory control is the most important aspect. The hospitals do not receive any monitoring input from the health control authorities on the general status of their performance. For this reason, they do not find it pressing to adopt any regulatory procedure for self-improvement. As the staff of municipal bodies that are entrusted the task of overseeing the HCWM in hospitals / health care establishments develop clandestine links with management, they do not penalize the hospitals on any acts of violation of proper waste management practices.

The professional bodies that are assigned the duty of overseeing the professional conduct in health care matters also do not consider it their institutional responsibility to intervene in this sector. Though many individual office bearers of Pakistan Medical Association have shown concern about unsatisfactory condition of HCWM, an organized response from the association is yet to come. It is probably due to the reason to protect the commercial interest of fellow professionals who run / over these facilities.

7.3.4 *Budgetary Constraints*

As reported by Civil Hospital Administration, budgetary constraints pose a serious problem in applying the routine procedure of HCWM. For instance, it was observed that the hospitals had a SOP for colour coded collection and disposal of different categories of waste. However due to the unavailability of appropriate funds, the entire waste was collected in one type of polythene bags. Similarly the much essential training, which is needed for the staff members at various stages, also suffered due to this count. The hospital could not devise a proper monitoring system to create proper checks and balances in the storage and internal automation procedures of waste collection. The non-willingness to pay for hospital waste management services was cited as a problem by the contracting firm entrusted with the task. It may be noticed that the charges were found to be reasonable by any standards. A rate schedule is presented in Annexure-1. Without a proper financially viable procedure, the sustainability was found to be a difficult proposition of run the service. With the rising value of fuel costs, the transportation of HCW has become a costly affair. It is feared that the contracting firms presently delivering the service to designated hospitals may not be able to extend the same level of performance, unless the contracting rates are revised.

7.3.5 *Mixing of HCW and Municipal Waste*

Municipal storage points for ordinary solid waste carry the additional hazard of contagious material dumped at the nearest location to the HCF. It becomes a challenge in respect to management from several perspectives. The frequency of disposal / collection of municipal and HCW vary. The former can be collected twice a thrice a week while the latter cannot be left in the open and has to be removed immediately. The compound effect of mixing HCW and municipal refuse is also very grave. It is common observation that the scavenging practices that take place on neighbourhood collection points get affected by the contagious material from the HCW. Thus other streams of waste management are also affected. Similarly the neighbourhoods and the large urban environment is at the health risk due to ongoing malpractice of this kind.

7.3.6 *Liquid Waste*

The liquid waste generated in all the scales of HCF is a serious and entirely unnoticed issue. It is not even addressed in the existing regulations. The complex impacts caused by this waste are discussed in an earlier section.

7.3.7 *Private Sector Participation*

The private sector can play a positive and expanded role in this domain. However it needs a working regulatory environment and efficient practices in contract management. It also has the ability to absorb the informal sector provided the appropriate type of incentives are created.

CHAPTER 8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

- (a) In comparison to the status of HCWM since the previous study done by WASTE, there is relative improvement in the situation. A basic institutional process of HCWM has been put in place by the CDGK although it is adversely affected by the non-cooperation of city's hospital managements to link up to the system. A service provider has developed reasonable capacity to handle the waste in a satisfactory manner from collection from the hospitals / other establishments to the incineration facility. There is enough potential that remains dependent upon the increase in the subscribers to the service in sufficient numbers.
- (b) The service is incomplete in its coverage with no accurate figures available to examine the actual status of the HCWM. There is an urgent need to undertake a detailed study at the level of Karachi and also the entire country to ascertain the nature and magnitude of HCWM service required to be structured in accurate terms. It will also be useful in identifying the ingredients of waste generation to evolve an appropriate upscaling of the existing service in Karachi or devising a new service in locations where it is not present at the moment.
- (c) Inadequate enforcement of a proper regulatory mechanism is the key handicap that has affected the performance of HCWM sector. The inability of the city authorities and provincial regulatory bodies to devise a framework for monitoring, evaluation and reporting the status of health care waste management is probably the key reason. At the operational level, the observed connivance between hospital / HCF managements and municipal staff does not allow any worthwhile system to shape up in correspondence to the needs. The professional bodies of medical doctors have also not taken any institutionalized position to deal with the issues. It has been found that a sizable number of practicing physicians are oblivious of the gravity of threats pertinent to HCW.
- (d) Dialogue with the stakeholders revealed that almost all the stakeholders are satisfied with the prevailing status quo. As no epidemic or health hazard has spread due to HCW, they seem to consider the situation as non-threatening. The concerns of the service providing enterprise are considered as directly linked to their commercial interests.
- (e) An unresearched and documented area of concern is the liquid waste from HCF which is passing into the normal waste stream and eventually into the marine environment, unchecked and untreated. It will be in the interest of the citizens to correlate the outbreak of many a diseases with no clear clue about the origins.
- (f) Hospital and municipal staff associated with the sector has been working without training about the fundamental aspects of HCWM. The practices have been found grossly inappropriate and dangerous. Lack of concern about using proper handling tools / equipment, inavailability of protective gear and intermittent contact with waste across the working cycle are some of the key issues that require attention.

8.2 8.2 Recommendations

In the light of the above study we recommend the following measures to ensure a proper disposal system:

- (a) There is a definite need to launch a campaign to induct the functioning hospitals of all scales and profiles in the service list of HCWM. Unless the full potential of existing frame work of service is utilized, very little improvement can be expected. The other category of health care establishments must also be inducted. A mechanism of stakeholder network and counseling must be developed to convince the various units to subscribe to this service.
- (b) Training and capacity building of the staff and managers is a critical need that must be addressed. The professional bodies such as Pakistan Medical Association may be entrusted the task. The training requirement exists for multiple levels including sanitary workers / sweepers, ward attendants, OT attendants, incinerator operators, vehicle operators and management staff. On the basis of situation analysis, training modules must be developed with adequate inclusion of on job training components also.
- (c) An independent monitoring oversee committee must be created to review the situation on a periodic basis. It may be composed of SWM experts, municipal functionaries, hospital owners / managers, contractor's representatives and concerned citizens groups / NGOs / CBOs. The CDGK may act as its secretariat. The objective of this committee into provide a forum for assessing the HCWM practices and extend an opportunity for stakeholders to find solutions to existing problems. The forum can also review the situation of the sector as a whole in a bid to contribute to the decision making process in a pro-active manner.
- (d) Legislation and guidelines must be prepared for liquid waste. Inputs must be acquired from Karachi Water and Sewerage Board (KWSB), SEPA, CDGK and HCFs/hospital managements. Its draft must be endorsed by all the stakeholder representatives to evolve a working consensus.
- (e) Sensitization and information dissemination must be facilitated by the media. The above mentioned committee may take upon itself to facilitate preparation of documentaries on the existing situation to inform the common people. Educational material / instructions may also be prepared to affect the behavior of the concerned.

ANNEX 1 SCHEDULE OF PAYMENT

To all Health Care Units

In continuation of CDGK Letter No., DO/SD&WM/DO-II(596)/07 dated 25/06/07; this is inform all healthcare institutions that **City District Government Karachi** has increased the charges for Incineration and Transportation with effect from July 1, 2008. The increase in charges is inevitable due to the increase in diesel, gas, electricity, labour expenses, etc., The new charges will remain valid till June 30, 2009. New schedule of charges is under:

Schedule of Charges (Per Month)

Category of Hospitals	No. of Beds in Hospitals	Incarnation Charges	Transportation Charges	Total Charges
A	1-10	2,200.00	1,100.00	3,300.00
B	11-25	4,400.00	2,100.00	6,500.00
C	26-50	6,500.00	3,200.00	9,700.00
D	51-100	11,000.00	5,300.00	16,300.00
E	101-200	17,200.00	8,800.00	26,000.00
F	201-400	21,600.00	10,700.00	32,300.00
G	401 and above	32,200.00	16,200.00	48,400.00
Category PL	Pathological Labs	4,400.00	2,100.00	6,500.00
Category GP	General Practitioner (Clinics)	1,400.00	600.00	2000.00

Pharmaceutical Industrial Waste 16.00/Kg. (Incineration Charges Only).

Note:

- 10% Discount is allowed for healthcare units who pay for full 1 year in advance (July 2008 – June 2009).
- No cash payments are allowed.
- The payment should be made by cross cheque in favor of City District Government Karachi.
- Healthcare units registered in categories A, B, C, GP and PL will be served on alternate days.
- Hospital hazardous waste is to be packed in leak proof bags and placed in the truck by the staff of healthcare units.
- No municipal solid waste should be mixed with healthcare hazardous waste.
- Penalties can be imposed under the Sindh Local Government Ordinance, 2001 through Section 195 Chapter XIX, Forth Schedule, Para 3 & 9 and Chapter XVI for wrongful disposal of hazardous waste.
- Selling of used syringes and other articles of healthcare waste are strictly forbidden as it is unethical and causes spread of diseases.
- Cooperate with the staff of M/s. Abaseen International (Pvt.) Ltd., to ensure proper working of the healthcare disposal system and for the betterment of population at large.

District Officer-II, CDGK
Municipal Solid Waste Management

Health Care Waste Management in Pakistan

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ANNEX 2

REGISTRATION FORM FOR HEALTH CARE FACILITEIS



City District Government Karachi (formerly KMC)

In Joint Venture with

Abaseen International (Pvt.) Ltd.,

For:

Collection, Transportation & Disposal of Hospital/Hazardous
Waste Through CDGK Incineration Plants

REGISTRATION FORM

- Type of Institution: Hospital / Clinic / Laboratory / Other - please specify _____
- Name of Institution: _____
- Address: _____ Tele / Fax Nos. _____
- Contact Person / Administrator / Owner: _____
- Number of Beds: (if applicable) _____
- Waste Generation (if known): _____ Kg/day.
- Waste Collection Day/Time: _____ Collection Frequency _____
- Present method of waste disposal if any: _____

_____, do hereby declare that the information submitted is correct.

Signature of authorized person :

Name :

Designation :

Stamp : _____

Contact :

Date: _____

City District Government Karachi
District Officer (SD & WM),
Karachi
Tele : 9215656

Abaseen International (Pvt.) Ltd.
502, Uni-Tower, I.I. Chundrigar Road,
Karachi.
Tele : 2413749/2415386 - Fax : 2417056