

Understanding our
civic issues

Biomedical Waste Management

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Bio Medical Waste Management – A Health or Environment Hazard!!

Demographic Profile - Mumbai

Once a cluster of seven islands - Colaba, Mazgaon, Old Woman's Island, Wadala, Mahim, Parel and Sion-Matunga- Mumbai has over the years become one island, partly by silting action of the sea and partly by the human agency. Originally, home to the kolis (fisher folk), the city is today the capital of Maharashtra and the financial capital of India. Mumbai, the commercial pulse of India and forefront of India's development in business, also has the busiest international airport and seaport in the country. The glory of the city is well described in its history. There were major changes in the administrative set up of Mumbai after the 1981 census. For all administrative purposes the district is divided into 24 Wards, but the 88 sections within these Wards remain same. The population of Mumbai in 1872 was only 6,44,400. As on March 1, 2001, the city had a population totalling 119,14,398. Although it has the strongest and the most diversified economy of any of India's metropolitan cities and higher levels of income and lower incidence of poverty with very high literacy rate, Mumbai continues to have serious infrastructure deficits. This is mainly in terms of housing and water supply. In 2001, the population of Mumbai's suburbs was more than 2.5 times of that of Mumbai, indicating a shift from the city to the suburbs or South Mumbai to North Mumbai. An overview of the decadal population growth is shown in Table 1.

Table 1: Population Data in Municipal Corporations of Mumbai Urban Agglomeration

Sr. No	Constituents	1971 Million	1981 Million	1991 Million	2001 Million
Total	Gr. Mumbai UA	6.59	9.42	12.59	16.36
1	Gr. Mumbai	5.97	8.24	9.92	11.91
a.	Mumbai Suburb	2.90	4.95	6.75	8.58
b.	Mumbai Dist.	3.07	3.28	3.17	3.32
2	Thane	0.20	0.43	0.80	1.26
3	Kalyan -Dombivilli	0.23	0.44	1.01	1.19
4	Ulhasnagar	0.16	0.27	0.36	0.47
5	Mira Bhayander	0.01	0.02	0.17	0.52
6	Navi Mumbai	-	-	0.30	0.70

The growing population also continually places a constant pressure on the health care delivery system. Planners, since 1950, have suggested decentralisation as one of the solutions.

Congruent with the population distribution trend is the health care delivery mechanism. An overview of the number of hospital beds shown in Table 2 indicates a higher concentration in the South Mumbai tapering down towards the suburbs.

Table 2: Number of Hospital beds in Mumbai

City Zone	Population 2001 census	Existing Beds
The City (<i>Ward A-G</i>)	3.32	21,874
Western Suburbs (<i>Wards H,K,P,R</i>)	5.09	10,504
Eastern Suburbs (<i>Wards L,M,N,S,T</i>)	3.49	8,084
Mumbai City Total	11.91	40,422

(Source: BMC Records and HOSMAC database)

The city, catering to a population of nearly 13 million with a concentration of more than 16,000 persons per sq. km, proudly includes approximately 1,100 health-care institutions, 47 blood banks, 26 eye banks, 262 family welfare centres, 13 centres for blind and disabled, 179 health centres, 308 pathological labs, 64 spastic centres, 663 vaccination centres, 108 CT scan & USG centres, 15 angiography centres, 12 MRI centres and 4 Gamma cameras - all constantly increasing. This can easily be witnessed with the upcoming hospitals all over the city right from LH Hiranandani Hospital, Godrej Memorial Hospital, Wockhardt Hospital and so on. This pressure of ever-increasing health care has also led to an obvious increase in the biomedical waste generated by them. Adding to its current problem of managing solid waste, the Municipal Corporation of Greater Mumbai (MCGM) has to also handle this very technical issue of regulating biomedical waste which is a potential biohazard and capable of transmitting infection. Of the total amount of almost 7,000 tonnes of waste generated by the city, almost 25 tonnes is estimated to be medical waste.

Bio Medical Waste – An Overview

Biomedical waste is the infectious waste generated from hospitals. Improper management of waste generated in health care facilities causes a direct health impact on the community, the health care workers and on the environment. The waste generated in these institutions essentially consists of solids and liquid, which may be hazardous, infectious and non-infectious. It has been estimated that up to 85% to 90%¹ of the waste generated in hospitals is non-infectious (free from microbes and has not been in contact

with any body fluids, which is similar to domestic waste). It is the remaining 10% to 20% of waste that is of concern because it is hazardous and infectious. Currently, approximately 20% to 40% of hospital waste can be recycled², but many hospitals recycle only 10% leaving tremendous scope for improvement. In addition, waste that is un-segregated and not treated in the right manner would cause environmental pollution affecting the health of the community. Till date, there was almost no research data on the amounts and types of waste generated by hospitals in India. From waste audits done at several hospitals by a few NGOs, we arrive at some figures which we can now be used and extrapolated for the whole country. These audits must be conducted only after adequate training on waste segregation is given to health care institutions.

The total amount of waste generated by three trust owned private hospitals in the city and a comparison of types of waste generated is presented below in Table 1 A and 1B

Table 3: Total Amount of Waste Generated

Hospital A	1.43
Hospital B	0.90
Hospital C	1.14

Table 4: Total Amount of Waste Generated / Type

	Red (infectious)	Green (recyclable)	Black (house hold)	Recyclable	Sharps	Yellow (anatomical)
Hospital A	0.33	0.14	0.87	0.14	0.09	
Hospital B	0.49	0.39	0.09	0.39	0.004	
Hospital C	0.2	0.23	0.6	0.23	0.03	0.12

The summary of total waste generated by hospitals in Mumbai is presented in Table 2.

Table 5: Category-Wise Waste Generated / Bed / Day

Waste Type	Kg/Bed/Day
Total Infectious	0.30
Non Infectious	0.41
Recyclable	0.05
Total Waste	0.76

The infectious waste, or the red and yellow bag waste as we define it, consists of all waste that is capable of transmitting infection and is patient-related. This includes blood-stained cotton, dressings, urine catheters, human anatomical parts including amputated limbs, IV sets and sharps like needles, syringes, etc.

² HOPE's experience.

Non-infectious waste can be effectively segregated further into bio-degradable and non-bio-degradable. Bio-degradable waste is disposed off using environment-friendly techniques like vermi-composting / composting and the non-bio-degradable waste can be further segregated and recycled / resold. This includes waste like mutilated IV bottles, glass; this can also lead to optimum utilisation of resources. It is in this category that one can look at working on modules like extended producer responsibility (EPR).

Knowledge about the importance of biomedical waste, its relationship with the environment, the environmental toxins used in health care industry and the impact of callousness on public health, remain very minimal. Clearly, raising the level of awareness and training regarding biomedical waste and environment-friendly health care needs to be given utmost priority, if legislations are to prove meaningful. Also, the health care industry needs to clean up its act quite literally.

There is also a demand for dissemination of knowledge on the subject in the neighbouring countries of Pakistan, Nepal, Malaysia and even South Africa who have requested Help Organization for People Environment & Society (HOPES) to help them on the subject.

To control the spread of infection from biomedical waste to harm human health, the Government of India passed the 'Biomedical Waste (Management & Handling) Rules, 1998, under the Ministry of Environment & Forest Act (MOEF). This came into force after due notification in the official Gazette of India in 1998. With two amendments - the last one in 2002 - the law is now in place, but its effective implementation is what will make the difference.

Current Scenario in Mumbai

Many health care institutions dump their infectious waste, along with the rest of the non-infectious waste, in the municipal garbage systems. The segregation system may also not be changed to reduce the incinerable waste and ensure proper colour-coding. Another category of waste is the untreated disposable and single-use items like syringes, IV catheters, medicine containers and wrappers. These too find their way into the garbage dumps, posing a serious risk to public health as well as a risk of scavenging. Some health care institutions may not even be complying with the Maharashtra Pollution Control Board (MPCB) standards prescribed in the Rules. With the MCGM biomedical waste incinerator shut for over a month, activists in the city are concerned that highly toxic medical waste is being sent to dumping grounds without being treated. Medical waste, like syringes, body parts and gloves, are considered hazardous, since they can pass on infections and diseases.

Hospital waste still finds its way to road side heaps of rubbish, where it mixes with municipal solid waste rendering it hazardous for the environment and the public. Even the animals are not spared; stray cattle near dumpsters ingest polythene packets and sharps and die from internal haemorrhage. Many of the stray animals, taken to the municipality animal house, have died due to intestinal obstruction and haemorrhages, as revealed by post-mortem reports.

Toxic emissions like dioxins, furan gases and carbon and sulphur particles from defective/inefficient incineration of chlorinated plastics from medical waste, cause modulation and disruption of growth factors, hormones, enzyme and developmental process. A draft report by the Environment Protection Act (EPA) estimates that as many as one in 1,000 of the most highly exposed people in the general population are at the risk of developing cancer because of dioxin.

To help health care institutions solve this problem, the MCGM has installed a central treatment facility (CTF) comprising an autoclave, a dual chamber incinerator with a scrubber and a shredder, along with transportation facility, which will accept segregated waste as per Schedule 1 of the MOEF Rules. There are also a few other private players now entering this market.

Medical waste management requires commitment from persons at all the levels in the health care facility. According to World Health Organisation, the human element is more important than technology in this field. Almost any system requires treatment and disposal by well-trained and well-motivated staff. A system that is managed by staff who do not understand the risks and the importance of their “contribution” is dangerous. Awareness regarding rules of disposal of biomedical waste needs to be instilled even among qualified medical personnel, including superintendents of hospitals and hospital administrators.

Proper handling may appear a costly affair, but it should always be remembered that at least 30%-40% of “add on” morbidity takes place because of improper disposal of hospital waste. A health care facility defeats the very purpose of its existence, if it adversely affects the health of its staff and community.

The Way Forward

The health care sector in India is growing at a rate of 17% annually and expects to reach a size of Rs1,862billion (US\$40.5billion) by 2005-06, which includes hospitals, pharmaceutical industries, Third Party Administrators (TPAs) and allied agencies. Being a labour-intensive service industry, education and awareness intervention on environment friendly health care practices would have a ripple effect in knowledge dissemination.

As it has been made conspicuously clear that training in proper waste segregation to health care institutions would have a multiple effect in that:

- It would save costs for health care institutions, since the infectious waste would be properly segregated,
- Waste minimisation and recycling techniques would save resources,
- Proper segregation ensures reduction in pollution hazards due to burning of chlorinated plastics going to the incinerator,
- Generates valuable manure and reduces the city's waste burden through organic composting techniques like vermi-composting.

Some thoughts on the way forward...

- All health care facilities need to follow the government guidelines. Segregation policies must be aimed at reducing the incinerable waste. Only category 1, 2 (human anatomical and animal parts) & 5 (discarded medicines & cytotoxic drugs) are required to go to the incinerator in yellow coloured bags for Mumbai. The rest infectious waste can go for Autoclaving and shredding at the CTF site.
- All non-infectious wastes like IV containers, glass vials, etc., can be effectively recycled.
- All non-infectious organic wastes can be recycled through organic composting / vermi-composting.
- We must work towards creating an environmentally responsible health care community and touch upon issues on environment friendly options like mercury & PVC elimination.
- More effective training tools like producing training videos for project sustainability should also increase the outreach to even remote / rural places.
- We must take care that polluting technologies like incinerators are not set up within densely populated city limits.
- Spruce up the biomedical waste transportation system.
- Guide hospitals and health care institutions in the city to keep back-up plans and also build capacity on environmentally sustainable solutions to send minimum waste for treatment to outside agencies.
- CTF capacities in the future should be decided only after thorough market research of a larger sample size waste audits conducted hospitals / institutions practicing good waste management techniques.
- A grey area that can be closely studied is looking at EPR in medical waste and chalking out an incentive-based programme for the stakeholders for better sustainability.
- Civil society and citizens in all sections must make a conscious effort to act as watchdogs.
- The legislative authorities including the pollution control boards and the government must take adequate action for omission / commission of the state law.
- Other facets of waste management must also include a deeper study relating to elimination of toxics from the health care stream and greening the supply chain.
- All health care institutions must join in this movement.

Thus medical waste with all its complexities can still be effectively handled. Lets work together to create an environment of care and healing...

Role of NGOs

India is witnessing serious environmental degradation due to the expansion of toxic industry that is affecting human health profoundly. Several NGOs are working in Mumbai on this issue:

1. HOPES - Help Organization for People Environment & Society (Tel No.: 2686 3447/2686 7120) is a Mumbai based NGO that works towards safe health care, environment practices and education entailing documentation and research on the Indian health care industry. It is currently involved in conducting training programs

and information dissemination on biomedical waste management. Beneficiaries under this service are hospitals, health care institutions, pollution control boards, and other health care providers. It is also part of a network of almost 300 NGOs & grass root voluntary workers in almost 60 countries working on causes of safe environment and health care practices. The organisation has also taken up market research on various issues like health care scenario, needs assessment on health care requirements of target consumers etc.

2. Mumbai Med Waste Action Group (Tel No.: 2371 6690/2375 9657) aims at creating citizen awareness about medical waste. It works with Toxics Link to foster more transparent public disclosure and co-operation. Toxics Link is a mechanism to source and deliver information on cleaner alternatives to dirty industries, tackle issues such as the import of toxic waste, industrial pollution and the movement of dirty industries from north to south, focussing on pollution prevention rather than pollution control.
3. Bombay First (Tel: 2497 5394 / 2497 5395) established its Solid Waste Management Committee in 1996. Its programmes include the Churchgate project, now extending to all of 'A' ward and parts of 'D' ward and the western suburbs, organising workshops on Solid Waste Management and the safe management of hospital waste.

Jagruti Bhatia, a microbiologist by qualification is a senior consultant with HOSMAC and also heads the NGO called HOPES (Help Organisation for People Environment & Society) which works on health, environment and education issues.

The facts presented and opinions expressed in this booklet are those of the author alone.

Series Editor: **Dr Nita Mukherjee**