

FAILED OR IGNORED?

THE DISASTROUS CASE OF BIO-MEDICAL WASTE MANAGEMENT IN JHARKHAND

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About Toxics Link

Toxics Link is an Indian environmental research and advocacy organization set up in 1996, engaged in disseminating information to help strengthen the campaign against toxics pollution, provide cleaner alternatives and bring together groups and people affected by this problem. Toxics Link's Mission Statement - "Working together for environmental justice and freedom from toxics. We have taken upon ourselves to collect and share both information about the sources and the dangers of poisons in our environment and bodies, and information about clean and sustainable alternatives for India and the rest of the world." Toxics Link has a unique expertise in areas of hazardous, medical and municipal wastes, international waste trade, and the emerging issues of pesticides, Persistent Organic Pollutants (POPs), hazardous heavy metal contamination etc. from the environment and public health point of view. We have successfully implemented various best practices and have brought in policy changes in the aforementioned areas apart from creating awareness among several stakeholder groups



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ABBREVIATION

Bureau of Indian Standards
Bio-medical Waste
Bio-medical Waste Management
Common Bio-medical Waste Treatment Facility
Community Health Centre
Central Pollution Control Board
Effluent Treatment Plant
Sewerage Treatment Plant
Healthcare Facility
Jharkhand State Pollution Control Board
Ministry of Environment, Forest & Climate Change
Primary Health Centre
Personal Protective Equipment
Toxic Equivalency
World Health Organisation

INTRODUCTION



Waste must be segregated, if not,



- By WHO

Health care waste counts all waste generated from health care establishments inclusive of, a) municipal or general solid waste and b) those with hazardous, infectious, radioactive, or genotoxic characteristics or 'bio-medical waste' (BMW). According to WHO, 75-90 percent of the waste from healthcare facilities is non-hazardous or general waste coming from housekeeping and maintenance. The remaining 10-25 percent only belongs to the hazardous category (BMW) posing a number of environmental and health risks.1 But if this 10-25% is not segregated and managed from the rest then the entire amount of healthcare waste becomes infectious posing a higher risk of spreading. India had introduced its first regulatory framework for management and disposal of Bio-medical waste in 1998 as the first South Asian nation to do so.² These rules [Bio-Medical Waste (Management and Handling) Rules, 1998] were based on the principles of source segregation of different categories of BMW, followed by containment, treatment, and disposal.³ In 2016, the Ministry of Environment, Forest & Climate Change, Government of India published the Bio-medical Waste Management Rules in suppression of the 1998 Rules. The 2016 rules aimed to further improve segregation, collection, processing, treatment and disposal of BMW in a comprehensive and clarified way with provisions, like,

- a) simplification of waste categorisation and color coding,
- b) bringing all healthcare facilities under the umbrella of authorisation requirements,
- c) listing of operator duties including collection, storage, disposal responsibilities, training of workers, immunisation, reporting and record keeping requirements, occupational safety, etc.

¹ WHO. 2014. Safe management of wastes from health-care activities. Edited by Y. Chartier et al. – 2nd ed.

² Onursal B. 2003.Health Care Waste Management in India: lesson from experience. The World Bank.

³ Ministry of Environment and Forest, Govt. of India. 1998. Bio-Medical Waste (Management & Handling) Rules, 1998.

- d) format for annual report,
- e) standards for treatment and disposal of BMW,
- f) duties of corresponding authorities, etc.

Bio-medical waste is defined in the BMWM Rules, 2016 as, 'any waste, which is generated during the diagnosis, treatment or immunisation of human beings or animals or research activities pertaining thereto or in the production or testing of biological or in health camps, including the categories mentioned in Schedule I of the rules.'

Despite a separate regulation in the country for over 20 years and the revised rules also being there for sometime now, their implementation on ground remained majorly inadequate. Concerns at the healthcare facilities are lack of information, knowledge, infrastructure and limited resources to manage BMW. At the state level, absence or inadequacy of treatment facilities and not having proper monitoring mechanisms in place are some of the major concerns. Both the previous and recent BMW Management rules are based on the principles of color coded segregation of biomedical waste which is often not met by many healthcare facilities across the country. Unsegregated waste or mixing of biomedical waste with municipal solid waste can potentially expose the entire community to a greater risk. A recent WHO assessment,⁴ conducted in the states of West Bengal, Bihar, Uttarakhand, Jharkhand, Karnataka and Rajasthan, found that only 10 percent of the hospitals comply with the proper segregation protocol as per the Rules. Partial segregation is carried out in 18 percent of the hospitals and the remaining 72 percent do not segregate the BMW at all. It was also observed in the report that 26 percent of the hospitals were not connected to any CBWTF while 50 percent of the facilities connected to a CBWTF, lacked a daily extramural waste collection frequency. Open dumping and burning of biomedical waste was documented in 56 and 32 percent of the hospitals respectively. Interim storage facilities were found to be either not existing or ill maintained in 88 percent of the cases. Even the personal health safety of the healthcare professionals were compromised with 78 percent of the hospitals not having any personal protective equipment and 68 percent not reporting injury cases. In 64 percent of the hospitals, healthcare professionals were not provided any training on BMW. Staff awareness was found to be average to poor for 77 percent of the cases. Findings of this report clearly suggest a severe lack in every layer of managing bio-medical waste in the country. Even when the facilities are connected to CBWTF on paper, there is no segregation or collection of waste. Open dumping practice was found to be continued. The WHO report also analysed the state level performance audit reports of the Comptroller and Auditor General of India (CAG) from 2013 to 2016. Inadequate treatment and disposal facilities, inefficient segregation at source, open burning, dumping, mixing and disposal of untreated waste, illegal selling of infected plastic waste to unauthorised recyclers and the presence of unauthorised HCFs were stated as the major concerns in these states.⁴

Current assessment of bio-medical waste management in Jharkhand is an initiative of Toxics Link from its state level assessment series in order to check the realities and bring in a countrywide sound and sustainable bio-medical waste management system.

⁴ World Health Organisation. 2017. Report on health-care waste management status in countries of the South-East Asia Region. New Delhi: World Health Organization, Regional Office for South-East Asia

HGHLGHTS BMW MANAGEMENT RULES, 2016

- Segregation of biomedical waste at the source of generation is the first and essential step in biomedical waste management & it continues to be the key message and central theme of the BMWM Rules, 2016.
- As per the BMW Rules, 2016 all the Bio medical waste shall be treated & disposed of in accordance with Schedule I and in compliance with the standards mentioned in the rule by the healthcare facilities and CBWTF.
- The ambit of the rules has been expanded to include vaccination camps, blood donation camps, surgical camps or any other healthcare activity; Considering the environmental hazards due to the emission of toxic gases like dioxin & furan owing to the inadvertent burning of chlorinated plastics, the new rule has made the provision to phase out chlorinated plastic bags, gloves and blood bags within two years. These bags shall be in compliance with The Bureau of Indian Standards (BIS) (which is to be formulated) and till then it should be as per Plastic Waste Management Rules, 2016 (i.e., = or > 50 µ thick)
- Occupier shall handover the segregated Bio Medical Waste as per Schedule I to Common Bio Medical Waste Treatment Facility including pretreated lab and highly infectious waste for treatment, processing and final disposal.
- Pre-treatment of the laboratory waste, microbiological waste, blood samples and blood bags through sterilization on-site by the occupier;
- Establish a Bar-Code System for bags or containers containing bio-medical waste for disposal;
- Bio-medical waste has been classified into four categories instead of ten to improve the segregation of waste at source; (refer the category at the end).
- Authorisation becomes mandatory for every occupier or operator handling bio-medical waste, irrespective of the quantity. Procedure to get authorization simplified.
- The standard for treatment and disposal of biomedical waste has been revised e.g. the acceptable Solid Particulate Matter emission has been reduced to 50 mg/Nm3 in the new rules. Similarly, the standard retention time in the secondary chamber has been increased from 1 second to 2 seconds. This is done to reduce the levels of hazardous gases like dioxins and furans.
- Inclusion of emissions limits for Dioxin and furans i.e. 0.1ngTEQ/Nm³ (at 11% O₂). Since the operating standard of the incinerator is revised, the existing incinerators are given 2 years time period to achieve the standards for treatment and disposal.
- State Governments to provide land for setting up common bio-medical waste treatment and disposal facility;
- No Occupier shall establish captive treatment, on-site treatment and disposal facility, if CBWTF is located within 75 km. If services of CBWTF are not available, occupier shall setup captive treatment facility as per authorization from State Pollution Control Board (SPCB).
- BMWM Rules, 2016 also describe monitoring at the level of HCFs through a bio-medical waste management committee (new or existing). Small HCFs with <30 beds have to designate a qualified person to review and monitor the activities related to bio- medical waste management.
- Operator of a common bio-medical waste treatment and disposal facility to ensure the timely collection of bio-medical waste from the HCFs.

- Newer technologies such as the use of plasma pyrolysis for incineration and hydroclave for disinfection of biomedical wastes are incorporated. This will lead to lesser environmental degradation, negligible health impacts, safe handling of treated wastes, lesser running and maintenance costs, more effective reduction of microorganisms, and safer disposal.
- As per the BMW rule, plastic waste should not be sent to landfill sites. The new rule has clearly mentioned that treated biomedical waste should not be given and mixed with other municipal solid waste. All recyclable waste should be sent to the registered or authorized recyclers or for energy recovery or plastics to diesel or fuel oil or for road making, whichever is possible.
- Occupier has to ensure occupational safety of all its health care workers and others involved in handling of biomedical waste by providing appropriate & adequate personal protective equipment and effective immunization against diseases likely to be transmitted.
- Occupier shall provide training to all its health care workers and others at the time of induction and therafter at least once every year.
- After treatment, the recyclables should be given to recyclers who are authorized / registered from prescribed authority.
- Handling and disposal of mercury waste and lead waste will be in accordance with the respective rules/guidelines. Chemical treatment using at least 1% hypochlorite solution or any other equivalent chemical reagent. It must be ensured that chemical solution has adequate strength to disinfect all the time during the chemical treatment.
- There will be no chemical pretreatment before incineration. Chlorinated plastics/bags shall not be incinerated.
- Disposal of bio-medical waste by deep burial shall be prohibited in towns and cities. Disposal by deep burial is permitted only in rural areas where there is no access to common bio-medical waste treatment facility, with prior approval from the prescribed authority. The deep burial facility shall be located as per provisions and guidelines issued by Central Pollution Control Board from time to time.
- Liquid waste generated from laboratory, washing, cleaning, housekeeping and disinfecting activities shall be treated along with other effluents generated from the premises of the occupier or the facility operator so as to meet the discharge standards stipulated under these rules.
- Another improvement in the new rules is in the monitoring sector. While the old rule had no clear provision for a monitoring authority, the BMW rules 2016 state that the MoEF&CC will review health care facilities once a year through state health secretaries, the SPCB and the CPCB. The SPCB, in its turn, will oversee implementation through district level monitoring committees that will report to the State Advisory Committee or the SPCB.

TABLE 1: Schedule I of the Bio-Medical Waste Management Rules, 2016: Revision Of Category Types(revised from previous 10 Categories to 4 categories)

Category	Type of Waste	Type of Bag or Container to be used	Treatment and Disposal options	
	(a) Human Anatomical Waste: Human tissues, organs, body parts and fetus below the viability period (as per the Medical Termination of Pregnancy Act 1971, amended from time to time).	Yellow coloured non- chlorinated plastic bags	Incineration or Plasma Pyrolysis or deepburial*	
	(b)Animal Anatomical Waste : Experimental animal carcasses, body parts, organs, tissues, including the waste generated from animals used in experiments or testing in veterinary hospitals or colleges or animal houses.			
	(c) Soiled Waste: Items contaminated with blood, body fluids like dressings, plaster casts, cotton swabs and bags containing residual or discarded blood and blood components.		Incineration or Plasma Pyrolysis or deep the burial* In absence of above facilities, autoclaving or micro-waving/ hydroclaving followed by shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent for energy recovery.	
YELLOW	(d) Expired or Discarded Medicines: Pharmaceutical waste like antibiotics, cytotoxic drugs including all items contaminated with cytotoxic drugs along with glass or plastic ampoules, vials etc.	Yellow coloured non- chlorinated plastic bags or containers	Expired `cytotoxic drugs and items contaminated with cytotoxic drugs to be returned back to the manufacturer or supplier for incineration at temperature >1200 °C or to common bio-medical waste treatment facility or hazardous waste treatment, storage and disposal facility for incineration at >1200°C or Encapsulation or Plasma Pyrolysis at >1200°C.	
			All other discarded medicines shall be either sent back to manufacturer or disposed by incineration.	
	(e) Chemical Waste: Chemicals used in production of biological and used or discarded disinfectants.	Yellow coloured containers or nonchlorinated plastic bags	Disposed of by incineration or Plasma Pyrolysis or Encapsulation in hazardous waste treatment, storage and disposal facility.	
	(f) Chemical Liquid Waste: Liquid waste generated due to the use of chemicals in production of biological and used or discarded disinfectants, Silver X-ray film developing liquid, discarded Formalin, infected secretions, aspirated body fluids, liquid from laboratories and floor washings, cleaning, housekeeping and disinfecting activities etc.	Separate collection system leading to effluent treatment system	After resource recovery, the chemical liquid waste shall be pre-treated before mixing with other wastewater. The combined discharge shall conform to the discharge norms given in Schedule- III.	

Type of Waste	Type of Bag or Container to be used	Treatment and Disposal options
(g) Discarded linen, mattresses, beddings contaminated with blood or body fluid.	Non-chlorinated yellow plastic bags or suitable packing material	Non- chlorinated chemical disinfection followed by incineration or Plazma Pyrolysis or for energy recovery.
		In absence of above facilities, shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent for energy recovery or incineration or Plazma Pyrolysis
 (h) Microbiology, Biotechnology and other clinical laboratory waste: Blood bags, Laboratory cultures, stocks or specimens of microorganisms, live or attenuated vaccines, human and animal cell cultures used in research, industrial laboratories, production of biological, residual toxins, dishes and devices used for cultures. 	Autoclave safe plastic bags or containers	Pre-treat to sterilize with non-chlorinated chemicals on-site as per National AIDS Control Organisation or World Health Organisation guidelines thereafter for Incineration.
Contaminated Waste (Recyclable) (a) Wastes generated from disposable items such as tubing, bottles, intravenous tubes and sets, catheters,urine bags, syringes(without needles and fixed needle syringes) and vaccutainers with their needles cut) and gloves.	Red coloured nonchlorinated plastic bags or containers	Autoclaving or micro-waving/ hydroclaving followed by shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent to registered or authorized recyclers or for energy recovery or plastics to diesel or fuel oil or for road making, whichever is possible. Plastic waste should not be sent to landfill sites.
Waste sharps including Metals: Needles, syringes with fixed needles, needles from needle tip cutter or burner, scalpels, blades, or any other contaminated sharp object that may cause puncture and cuts. This includes both used, discarded and contaminated metal sharps	Puncture proof, Leak proof, tamper proof containers	Autoclaving or Dry Heat Sterilization followed by shredding or mutilation or encapsulation in metal container or cement concrete; combination of shredding cum autoclaving; and sent for final disposal to iron foundries (having consent to operate from the State Pollution Control Boards or Pollution Control Committees) or sanitary landfill or designated concrete waste sharp pit.
 (a) Glassware: Broken or discarded and contaminated glass including medicine vials and ampoules except those contaminated with cytotoxic wastes. b) Metallic Body Implants 	Cardboard boxes with blue colored marking Cardboard boxes with blue colored marking	Disinfection (by soaking the washed glass waste after cleaning with detergent and Sodium Hypochlorite treatment) or through autoclaving or microwaving or hydroclaving and then sent for recycling.
	Type of Waste(g) Discarded linen, mattresses, beddings contaminated with blood or body fluid.(h) Microbiology, Biotechnology and other clinical laboratory waste:Blood bags, Laboratory cultures, stocks or specimens of microorganisms, live or attenuated vaccines, human and animal cell cultures used in research, industrial laboratories, production of biological, residual toxins, dishes and devices used for cultures.Contaminated Waste (Recyclable)(a) Wastes generated from disposable items such as tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes(without needles and fixed needle syringes) and vaccutainers with their needles cut) and gloves.Waste sharps including Metals:Needles, syringes with fixed needles, needles from needle tip cutter or burner, scalpels, blades, or any other contaminated sharp object that may cause puncture and cuts. This includes both used, discarded and contaminated metal sharps(a) Glassware: Broken or discarded and contaminated with cytotoxic wastes.b) Metallic Body Implants	Type of WasteType of Bag or Container to be used(g) Discarded linen, mattresses, beddings contaminated with blood or body fluid.Non-chlorinated yellow plastic bags or suitable packing material(h) Microbiology, Biotechnology and other clinical laboratory waste: Blood bags, Laboratory cultures, stocks or specimens of microorganisms, live or attenuated vacines, human and animal cell cultures used in research, industrial laboratories, production of biological, residual toxins, dishes and devices used for cultures.Autoclave safe plastic bags or containersContaminated Waste (Recyclable) (a) Wastes generated from disposable items such as tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes(without needles and fixed needle syringes) and vaccutainers with their needles cut) and gloves.Red coloured nonchlorinated plastic bags or containersWaste sharps including Metals: Needles, speinges with fixed needles, needle form needle tip cutter or burner, scalpels, blades, or any other contaminated sharp object that may cause puncture and cuts. This includes both used, discarded and contaminated metal sharpsPuncture proof, Leak proof, tamper proof containers(a) Classware: Broken or discarded and contaminated with cytotoxic wastes.Cardboard boxes with blue colored markingb) Metallic Body ImplantsCardboard boxes with blue colored marking

STANDARDS FOR LIQUID WASTE UNDER BMWM RULE 2016:

The effluents generated or treated from the premises of occupier or operator of a common biomedical waste treatment facility, before discharge should conform to the following limits.

Parameters	Permissible limits
рН	6.5-9.0
Suspended solids	100 mg/l
Oil and grease	10 mg/l
BOD	30 mg/l
COD	250 mg/l
Bio-assaytest	90%survival of fish after 96 hours in100%effluent.

Bio-Medical Waste Management (Amendment) Rules, 2018: The amendment exempts the use of chlorinated blood bags and extends the phasing out of the use of chlorinated plastic bag and gloves by 27th March, 2019. Similarly, the mandate for health care facilities (any number of beds) to make the BMW annual report available on their website also got extended within a period of two years from the date of publication of Bio-Medical Waste Management (Amendment) Rules, 2018. The amendment makes the effluent standards for HCFs mentioned in BMWM Rules, 2016 applicable to the occupiers of Health Care Facilities (bedded) which are either connected with sewerage network without terminal sewage treatment plant or not connected to public sewers. For discharge into public sewers with terminal facilities, the general standards notified under the Environment (Protection) Act, 1986 (29 of 1986) shall be applicable. It also mandates installation of Sewage Treatment Plant by 31st December, 2019 for Health Care Facilities having less than ten beds.

THE STATE: JHARKHAND



2.1 STATE PROFILE

Jharkhand became a state bifurcating from the southern part of Bihar in 2000. Jharkhand, covered by Chotanagpur Plateau, is bordered by the states of Bihar to the north, Uttar Pradesh to the northwest, Chhattishgarh to the west, Orissa to the south and West Bengal to the east. It has an area of 79,710 km² (30,778 sq mi). With Ranchi being its capital and Dumka the sub capital, the state currently has 5 divisions and 24 districts. Almost all the districts of Jharkhand share a border with neighboring states, except Lohardaga and Khunti and that makes the dynamics of waste management challenging as there can be inter-state movements from almost every district. The state is endowed with natural resources, like adequate water resources, fertile land and mineral wealth accounting for more than 40% of the mineral resources of India. Yet Jharkhand has the third lowest human development index (HDI) in the country with 39.1% of the population falling below poverty line and 19most backward districts. According to the 2011 census, Jharkhand has a population of 32,988,134 consisting of 16,930,315 male and 16,057,819 female populations. Primarily, a rural state, Jharkhand has only 24 percent of its population living in cities.

The study has been carried out in five major cities of the state, namely Ranchi, Dhanbad, Jamshedpur (in East Singhbhum district), Bokaro and Deoghar. The principal demographic statistics of the state as well as the corresponding districts are as follows:

TABLE 2: Demographic Statistics of	f the Study Area (Jharkhand	& concerned districts)
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Name	Household	Population	Population Male	Population Female	Child Population (%)	Population SC-ST (%)	Literacy (%)
JHARKHAND	6254781	32988134	16930315	16057819	16	38	56
Deoghar	264347	1492073	775022	717051	18	25	53
Dhanbad	507064	2684487	1405956	1278531	14	25	64
Bokaro	394918	2062330	1072807	989523	14	27	62
Ranchi	569444	2914253	1494937	1419316	14	41	66
East Singhbhum	476931	2293919	1176902	1117017	13	33	66

2.2 THE HEALTHCARE SECTOR IN JHARKHAND

Status of the health sector reflects significantly on the social and economic development of a state. It is important to understand the basic healthcare structure/facilities of the state in order to discuss their waste management strategies and implementation status quo. Jharkhand shares the status of Empowered Action Group (EAG) states, that is, the most socio-economically backward states along with Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, Uttarakhand and Uttar Pradesh.⁵ Thereby, the state shares the characteristics of high infant mortality, high maternal mortality and high mortality due to infectious and contagious diseases.⁶ Naturally, health is one of the most important thrust areas of the state's development agenda,⁷ yet the health expenditure is only 4.82 percent of the total state expenditure which is even less than the average state level health expenditure in the country (5.34% non EAG states, 5.05% EAG states).⁵

The matters of health in the state come under the purview of the Department of Health, Medical Education & Family Welfare, Government of Jharkhand. The public health system is managed by a number of state run or public-private partnership organisations at various levels like State Health Society, District Health Society, Jharkhand Health Systems Resource Centre (JHSRC), Jharkhand Rural Health Mission Society (JRHMS), Programme Management Unit, Village Health Committee, Hospital Management Society, etc. Central health programmes by Ministry of Health and Family Welfare (MoHFW) are integrated as the Health Programme and Information Management System (HPIMS) in Jharkhand. Jharkhand government does not have any health and drug policy. According to the Policy Guidelines on public-private partnership, the health sector in Jharkhand is given the status of industry.⁸ The Institute of Public Health (IPH) has become a centre of national and international knowhow in the medical field.⁹ There are three government medical colleges in the state, one each in Jamshedpur (M.G.M. Medical College), Dhanbad (Patliputra Medical College) and Ranchi (Rajendra Institute of Medical Sciences) with a total admission capacity of 300. Jharkhand currently has 3848 Health Sub Centers (HSCs), 297 Primary Health Centers (PHCs), 188 Community Health Centers (CHCs), 32 Referral Hospital, 23 District Hospital (DHs) and 13 Sub-Divisional Hospitals (SHs) and 99 mobile medical units (MMUs).¹⁰ However, the number of villages covered by

⁵ National Health Profile 2018. 13th Issue. Central Bureau of Health Intelligence Directorate General of Health Services Ministry of Health & Family Welfare, Government of India. Available at https://cdn.downtoearth.org.in/pdf/NHP-2018.pdf accessed on 11.04.2019

⁶ Health Situation in India and Jharkhand. Available at http://shodhganga.inflibnet.ac.in/bitstream/10603/162309/9/09_ chapter%204.pdf accessed on 11.04.2019

⁷ Jharkhand Visions and Action Plan 2021. Govt. of Jharkhand. Available at https://finance-jharkhand.gov.in/pdf/Executive_ Summary_Jharkhand_Vision_and_Action_Pln.pdf accessed on 11.04.2019

⁸ https://peoplesdemocracy.in/2015/0830_pd/initiatives-health-issues-jharkhand

⁹ Government of Jharkhand official website: http://www.jharkhand.gov.in/health accessed on 12.04.2019

¹⁰ Health Management Information System, National Health Mission, Ministry of Health & Family Welfare, Government of India. Rural health infrastructure, Section III. Available at https://nrhm-mis.nic.in/RURAL%20HEALTH%20STATISTICS/(A)RHS%20-%20 2017/Rural%20Health%20Infrastructure.pdf accessed on 29.04.2019.

a PHC is the highest in Jharkhand among all states.¹¹ This is the most obvious in districts of Ranchi, Deoghar, Dumka and Garhwa.

The state has a total of 5093 doctors (registered with Medical Council and qualified under I.M.C Act) of which 1793 govt. allopathic doctors are serving at a rate of one per 18,518 of the population which is the second highest in the country after Bihar.⁵

2.3 THE STORY OF BIO-MEDICAL WASTE MANAGEMENT SO FAR IN JHARKHAND

2.3.1 AS REPORTED BY THE JHARKHAND STATE POLLUTION CONTROL BOARD

The Jharkhand State Pollution Control Board (JSPCB) is the prescribed regulatory authority to look after the management of bio-medical waste in the state. Post implementation of the BMWM Rules, 2016, the board submitted three comprehensive annual reports to the Central Pollution Control Board (CBCB) as of now which is briefed as follows:

	201612	2017 ¹³	201814
Total HCFs	1150 (Bedded: 1026; Non- bedded: 124)	1086(Bedded: 1009; Non- bedded: 77)	1558 (Bedded: 1066; Non- bedded: 492)
Total No. of beds	25,573	28,771	26,550
Status of authorisation	Applied for: 1048 Authorisation granted: 143 Application under consideration: 908 Application rejected: 01	Applied for: 1030 Authorisation granted: 172 Application under consideration: 267 Application rejected: 167	Applied for: 509 Authorisation granted: 143 Application under consideration: 365 Application rejected: 07 HCFs operating without applying for authorisation: 106
BMW Generation (kg/ day)	Total: 12829.98 Bedded HCFs: 12572.88 Non-bedded HCFs: 257.1	Total: 12498.04 Bedded HCFs: 11722.04 Non-bedded HCFs: 744.2554	Total: 12788.2 Bedded HCFs: 12418.6 Non-bedded HCFs: 369.6
Captive BMW Treatment & Disposal by HCFs (Bedded)			
Incinerator	13	18	17
Plasma Pyrolysis/ Autoclave/ (+) Hydroclave	93+1	180+1	181
Shredder	307	213	213
Sharps encapsulation or concrete pit			
Deep burial pits	25	378	374
Total waste treated (Bedded + Non- bedded) (kg/day)	No information available	8592.9903	4333.6237

¹¹ Confederation of Indian Industry & Jharkhand State Council. CII Vision Document: Jharkhand@2022. Available at http://www. indiaat75.in/document/jharkhandvissiondocument.pdf accessed on 12.04.2019

12 JSPCB. 2016. BMW Management Annual Report 2016.

Available at http://jspcb.nic.in/upload/uploadfiles/files/Annual%20repoer%202016-Final.pdf accessed on 15.04.2019
 JSPCB. 2017. BMW Management Annual Report 2017. Available at http://jspcb.nic.in/upload/uploadfiles/files/Annual%20
 Report-%20BMW-2017.pdf accessed on 15.04.2019.

¹⁴ JSPCB. 2018. BMW Management Annual Report 2018. Available at http://jspcb.nic.in/upload/uploadfiles/files/BMW%20 Annual%20Report-2018-Approved.pdf accessed on 15.04.2019.

	201612	2017 ¹³	2018 ¹⁴			
BMW Treatment & Disposal by CBWTFs						
Incinerator	ncinerator Number: 2 Total Capacity: 200 kg/Hr Waste treated: 465 kg/day		Number: 2 Total Capacity: 400 kg/Hr Waste treated: 485 kg/day			
Autoclave	Number: 2 Total Capacity: 200 kg/day Waste treated: 276 kg/day	Number: 2 Total Capacity: 200 kg/day Waste treated: 280 kg/day	Number: 2 Total Capacity: 200 kg/day Waste treated: 276 kg/day			
Shredder	Number: 2 Total Capacity: 25 kg/day Waste treated: 112 kg/day	Number: 2 Total Capacity: 25 kg/day Waste treated: 122 kg/day	Number: 2 Total Capacity: 25 kg/day Waste treated: 112 kg/day			
Effluent Treatment Plant	Number: 1 Total Capacity: 1500 L/day Waste treated: 1500 L/day	Number: 2 Total Capacity: 3000 L/day Waste treated: 1500 L/day	Number: 1 Total Capacity: 1500 L/day Waste treated: 1500 L/day			
Total Waste Treated (including liquid waste)	2353 kg/day	2387 kg/day	2387 kg/day			
Total BMW Treated (Captive + CBWTF; excluding liquid waste)		9479.9903 kg/day	5205.0056 kg/day			
Other Information						
Show cause notices to defaulter HCFs	HCF: 701	HCF: 701 CBWTF: 1	HCF: 187			
HCFs that submitted annual report	143	143	586			
No. of workshops/ trainings conducted	01	01	NA			
No. of HCFs that installed liquid waste treatment facility	Nil	Nil	15			
Information on CBWTF						
Number	1 (BGL)	1 operative, 2 nd one started operation on trial basis	2 (Bio Genetic Laboratory Pvt. Ltd., Ramgarh and Medicare Environment Pvt. Ltd., Lohardaga)			
Coverage area	r ea 150 km No information ava (Hazaribagh, Ramgarh, Ranchi, Jamshedpur)		No information available			
No. of HCFs covered	455					
No. of beds covered	7853					
BMW collected	2353 kg/day					

2.3.2 BIOMEDICAL WASTE ANNUAL REPORTS BY CENTRAL POLLUTION CONTROL BOARD^{15,16}

The annual report information on bio-medical waste management scenario in the state of Jharkhand as reported by the CPCB based on the submission by JSPCB is as follows:

	Jharkhand 2016	Jharkhand 2017
Total no. of Bedded Health Care Facilities (HCFs)	1026	1009
Total no. of Non-bedded Health Care Facilities (HCFs)	124	432
Total No. of Health Care Facilities (HCFs)		1086
Total no. of Beds	25573	28771
Total no. of HCFs applied for authorization	1048	130
Total no. of HCFs granted authorization	143	172
Total no. of applications under consideration	908	
Total no. of applications rejected	1	
Total no. of HCFs in operation without applying for authorization	INP	NIL
Total Quantity of BMW generated (kg/day)	12829.98	12498.04
Total Quantity of BMW Treated and Disposed (kg/day)	2353	10979.99
No. of HCFs having Captive Treatment Facilities	INP	NIL
No of Captive Incinerators Operated by HCFs	13	13
CBWTFs Operational	1	2
CBWTFs under Construction	NIL	NIL
Total BMW treated by captive treatment facilitiesby HCFs (kg/day)	INP	8592.99
Total BMW treated by CBWTFs (kg/day)	2353	2387
Total No. of show cause notices/directions issued to defaulter HCFs/CBWTFs	702	702

2.3.3 WHERE DID THE GOVERNMENT MECHANISM FAULTER IN MANAGING BMW IN JHARKHAND

A closer look at the annual reports of JSPCB & CPCB and one can see the number of inconsistencies that follow. None of the reports have any sort of textual interpretation or justification against the numbers stated. Between the year 2017 and 2018, the number of healthcare facilities have increased by 472 whereas the number of beds have decreased by 2221. At the same time, biomedical waste generation has reportedly increased for a decreasing bed number from 2017 to 2018. A similar but opposite incoherency was found in the reports from 2016 to 2017. No biomedical waste inventory is available for the state in the public domain to know about the state specific HCF category-wise per bed waste generation. Of the 17 incinerators reportedly installed as captive treatment facilities in 2018, details of only 7 are provided (mostly in Jamshedpur & Ranchi). No information is provided on whether these incinerators are complying with the norms, standards of emissions or not. It is to be noted that both the existing CBWTFs are at a distance of less than 75 km from Ranchi. Also 374 deep burial pits are reported to be in operation. However, it shall be noted that according to the BMWM Rules 2016, "Disposal by deep burial is permitted only in rural or remote areas where there is no access to common biomedicalwaste treatment facility" and "Installation of in-house incinerator is not allowed. However in case there is no common biomedical facility nearby, the same may be installed by the occupier after taking authorisation from the State Pollution Control Board." In 2018, only 143 HCFs were granted authorization and 586 HCFs have submitted their annual report. Nowhere in the reports any reasons are given for the deterrence or delay in granting authorization. Also it is not

¹⁵ CPCB. 2016. Status on Bio-medical Waste Management Scenario and recommendations for ensuring compliance to the Biomedical Waste Management Rules, 2016. Availale at https://cpcb.nic.in/uploads/hwmd/AR_BMWM_2016.pdf accessed on 15.04.2019

¹⁶ CPCB. 2017. Annual Report on Biomedical Waste Management as per Biomedical Waste Management Rules, 2016 For the year 2017. Availale at https://cpcb.nic.in/uploads/hwmd/AR_BMWM_2017.pdf accessed on 15.04.2019



Waste generation, bed number and number of healthcare facilities are always disproportionate to each other

AS CAPTIVE TREATMENT FACILITIES AT HCFs



COMMON BIO-MEDICAL WASTE TREATMENT FACILITY



In-house incinerator can only be installed if there is no CBWTF & with authorisation. Disposal by deep burial is permitted only in rural or remote areas where there is no access to CBWTF. Needs prior approval.

There was 1 CBWTF in 2016 & 2 in 2017 & 2018. However, number of equipment reported are same throughout. No information on individual CBWTFs

COMPLIANCE STATUS IN THE STATE

41% BMW Treated in 2018

29% HCFs granted authorisation **38%** HCFs submitted annual reports

Annually 2,754 tonnes of bio-medical

waste are left untreated in Jharkhand for an annual generation of 4,668 tonnes of bio-medical waste mentioned whether any measures are taken for the HCFs not submitting annual reports. For the CBWTFs, on one hand the incinerators are reported to run far below their capacities at a rate of only 2% even if their run times are considered only 8 hours. On the other hand, the shredders reported to be treating waste 5 times more than their daily capacities. Total amount of waste treated in the state, combining the captive (HCF) and CBWTF treatments, also goes down to almost half from the year 2017 to 2018. Interestingly, the total treated

BMW data (10979.99 kg/day) in the CPCB records of 2017 (which certainly is submitted by JSPCB) includes the ETP treated liquid by CBWTF too against a waste generation record excluding the effluents (12498 kg/day). Thereby, it looks like 88% of the generated BMW in Jharkhand is getting

treated when in actuality 76% of the

waste treatment is achieved in 2017 in the state that too considering the data inconsistencies and the shredders treating 5 times beyond their capacities. However, in 2018, the state government reported the treatment of only 5205 kg/day BMW against a generation of 12788.2 kg/day which is only 41% of the daily generation. It can be said that the government information available in the public domain is misleading, misreported and grossly inadequate.^{11,12,13,14,15}





2.3.4 BMW MANAGEMENT SITUATION IN THE HEALTHCARE FACILTIES OF JHARKHAND AS OBSERVED IN PREVIOUS STUDIES

Immediately after implementation of BMWM Rules, 2016, Centre for Science and Environment (CSE) conducted a survey-based study in two biggest cities of Jharkhand, viz., Ranchi and Dhanbad. The report cited improper segregation and handling of bio-medical waste management by the HCFs at every stage, neither pertaining to the 1998 Rules, nor to the 2016 Rules. At least 42 percent of the HCFs surveyed were found not to be following even the basic segregation guidelines. Inadequately colored and bio-hazard marked containers, open intramural waste transportation, storing of BMW beyond 48 hours at the hospital premises, non-maintenance of waste records and even getting the waste generation data in reverse from CBWTF, random mixing of non-sanitary water with sewerage without treatment were the major findings of the study. Open dumping and burning of the used syringes were also reported at the location of vaccination. Illegal selling of the infected hospital solid plastic waste directly to local scrap dealers was also noted in the report. Over 40 per cent of bio-medical waste generated in Jharkhand goes untreated daily, the study observed.¹⁷

2.3.5 STATUS OF THE COMMON BIO-MEDICAL WASTE TREATMENT FACILITIES IN JHARKHAND

Currently, there are two Common Bio-medical Waste Treatment Facilities in operation in Jharkhand, namely, Bio Genetic Laboratory Pvt. Ltd. at Ramgarh and Medicare Environment Pvt. Ltd. at Lohardaga. Location-wise both these districts are bordering Ranchi. Medicare started its operation on trial basis in 2017 and fully from 2018. JSPCB report (2018) mentions two more CBWTFs under construction in the state. Thoughthe 2016 Annual report (JSPCB) provided some information on

¹⁷ Centre for Science and Environment (CSE). 2017. Not Handled With Care: A survey of biomedical waste management practices in Jharkhand. Available at http://www.indiaenvironmentportal.org.in/files/file/Color-Biomedical-waste-management-andhandling-practices-in-Jharkhand.pdf accessed on 15.04.2019

Bio Genetic, successive reports (2017 & 2018) refrained from giving out any detail on the individual CBWTFs. Despite having a new CBWTF in operation from 2017-2018, the JSPCB annual reports show constant number of equipments (incinerator, autoclave, shredder) and almost same amount of waste getting treated in 2016, 2017 and 2018 in the CBWTFs. None of these CBWTFs have any web-presence which is mandatory according to the BMWM Rules, 2016 and the dateline for developing own website (27.03.2017) has also long exceeded. Thereby, with almost zero availability of information in the pubic domain on these CBWTFs, there are absolutely no ways to know the areas they cover, HCFs they cater services to, facilities they have, waste they treat or even the annual reports submitted to the Board. These information are supposed to be presented in the website of a CBWTF.¹⁸According to the 2009 Annual Report of CPCB, 'the CBWTF namely M/s BioGenetic Lab (P) Ltd. Dhanbad is fully closed since April 2008 in compliance with the Direction under Section 5 of E (P) Act, 1986 issued by CPCB'. This is the same CBWTF with its registered address in Dhanbad and treatment facility located at Ramagarh. There is no information available in the public domain regarding the reasons for closure direction or the reauthorisation of the CBWTF.

¹⁸ CPCB. 2016. Revised Guidelines for Common Bio-medical Waste Treatment and Disposal Facilities. CPCB, Ministry of Environment Forest & Climate Change, Govt. of India.

OBJECTIVE

The case of prolonged ignorance and subsequent compromise in bio-medical waste management seriously violates India's commitments to achieving at least 4 sustainable development goals directly. The respective SDGs are SDG 3/Good Health and Well-being; SDG 6/ Clean Water and Sanitation; SDG 11/Sutainable Cities and Communities and SDG 12/Responsible Consumption and Production.

Given the situation of mis-management of bio-medical waste prevailing in Jharkhand even after 2 years of implementing the BMWM Rules, 2016 in Jharkhand, there lies a number of serious and often life-threatening risks. The failures that we could see were at multi-level and can very well lead to on-ground illegal trading, open dumping, open burning, disposal with municipal waste, etc. These are the routes of reusing used medical devices, syringes, gloves, intravenous tubes etc, thereby, compromising health care services to citizens and posing serious public health concerns. Picking up from these lines, Toxics Link - a premier organisation in the country which has been working on bio-medical waste - observed that it is of utmost importance to understand the magnitude of the problem in the state. Under the scope of the current study, we have tried to look after the gaps in availability of information, infrastructure, management, knowledge, attitude and practices regarding bio-medical waste management in the state of Jharkhand.

While our overall goal is to achieve environmentally sustainable management of biomedical waste by ensuring compliance at all levels to the Bio-medical Wast Management Rules, 2016, more precise objectives are as follows:

- To understand the overall scenario of biomedical waste in the State of Jharkhand
- To assess the knowledge, attitude and practices of healthcare facilities in the state regarding BMW management
- To advocate for better regulatory planning, implementation and monitoring of bio-medical waste management in the state

Under the scope of the current study, we have tried to look after the gaps in availability of



regarding biomedical waste management in the state of Jharkhand.

METHODOLOGY





BACKGROUND RESEARCH



VISIT TO HEALTHCARE FACILITIES & WASTE AUDIT



VISIT TO LANDFILLS

The study is a collaboration work of Toxics Link with LokSwar in Jharkhand comprising of both secondary and primary research and analysis.

Secondary Research: Background research and analysis was carried out based on the national reports, available state level information and reports, research papers and other publications in order to, a) strengthen the context, b) gather existing information in the state on BMW, c) evaluate the current situation of BMW management and the roles played by different stakeholders in the state, d) setting up of the primary study frameworks.

Primary Survey & Analysis:

- The primary study was carried out in five major cities of Jharkhand, namely, Ranchi, Dhandbad, Jamshedpur, Bokaro and Deoghar to understand a broad representation on the status of BMW management in the state.
- ii. To understand the BMW management situation at various tiers of the healthcare system, different categories of the healthcare facilities were investigated in these cities, viz., Referral Hospital (Govt. medical college), Govt. district/bedded hospitals, Govt. Community Health Centres (CHC), Govt. Primary Health Centres (PHC) both in urban and rural locations, Private Hospital (Multispeciality>100 bedded), Private Hospital (Multispeciality>20 bedded).
- iii. A total number of 31 HCFs were visited from the state: This includes one referral hospital, and one each of the remaining six categories of HCFs mentioned in point II (of Primary Survey & Analysis) from all five cities.
- iv. The investigations were carried out through physical visits to the HCFs, interacting with concerned staffs (administrator or medical officer, staffs dealing with waste, nurses, etc.) and visual observations in the facilities.

A structured questionnaire-based survey was developed for conducting the investigation to understand waste generation, waste disposal practices and infrastructure (segregation, collection, storage, transport) by the HCFs, occupational safety, awareness levels, compliance with the rules, etc. A thorough photo documentation (where feasible) was carried out for the observations during the investigations.

- v. Data analysis & reporting: The data gathered from all the investigated HCFs was tabulated and analysed graphically using Microsoft Excel. The observations were also documented against each parameter.
- vi. Investigation for illegal dumping or sale: An observation based survey was conducted by visiting the municipal dumping sites or landfills and local markets to figure out mixing of BMW with Municipal Solid Waste (MSW) and illegal sale of the waste, if any.

ASSESSMENT OF BMW MANAGEMENT STATUS IN THE HOSPITALS OF JHARKHAND

Covered 5 cities 31 Healthcare facilities 3037 beds 11% of the state's bed strength The knowledge, attitude and practice study was carried out in 31 HCFs in five major cities of Jharkhand, viz., Ranchi, Dhandbad, Jamshedpur, Bokaro and Deoghar covering a total bed strength of 3037 which is 11 percent of the total bed strength of the state. The HCFs investigated were primarily multispeciality ones with some (particularly the PHCs) having basic healthcare facilities along with maternity care units.



FIGURE 2: Category wise number of HCFs covered in 5 cities surveyed in Jharkhand

TABLE 3: Category wise HCFs visited during the study

Category of HCFs	HCFs visited	Bed strength
Referral Hospital	MGM Medical College & Hospital, JAMSHEDPUR	500
Govt. district/bedded hospitals	JAMSHEDPUR District Hospital	100
	DEOGHAR District Hospital	100
	RANCHI District Hospital	100
	DHANBAD Medical College & Hospital	1000
	BOKARO District Hospital	100
Govt. CHC	JAMSHEDPUR: Kashida, Ghatsila	30
	DEOGHAR: Pagla Baba Ashram, Jasidih	30
	RANCHI: Hinoo Ranchi Road, Doranda	30
	DHANBAD: East of Pandey Muhalla, Saraidhela	30
	BOKARO: ITI More chas	30
Govt. PHC (Urban)	JAMSHEDPUR: Station road Jugsalai market	10
	DEOGHAR: Gola Chowk, Madhupour Road	10
	RANCHI: Sadabahar chowk, Namkumcantt	10
	DHANBAD: Azad Nagar, Bhuli	10
	BOKARO: Bhendra, Nawadih	10
Govt. PHC (Rural)	JAMSHEDPUR: Ghatsila, Purbisingbhum	10
	DEOGHAR: Sandi Village	10
	RANCHI: Kathitand, RatuBasti	10
	DHANBAD: Gansihdih,Nirsa Road	10
	BOKARO: Gousala chowk, BokaroDhanbad road	10
Private Hospital: >20 < 100 bedded (Multispeciality)	JAMSHEDPUR: Gurunanak Hospital	55
	DEOGHAR: Sudhir Hospial	26
	RANCHI: Life line hospital	50
	DHANBAD: Sarwamanla Nursing Home	26
	BOKARO: Shiv Shakti Hospial	30
Private Hospital: >100 bedded (Multispeciality)	JAMSHEDPUR: Bramahanandnarayna	150
	DEOGHAR: Baidhnath Netralay	100
	RANCHI: Medica hospital	150
	DHANBAD: Asarfi Hospital	150
	BOKARO: Muskan Hospital	150

5.1. SEGREGATION OF BIO-MEDICAL WASTE

Segregation of bio-medical waste at source, that is, at the generation points is the basic requirement for management of BMW under any system. However, when the Jharkhand HCFs were visited, only 3 of the 31 hospitals(District Hospital Jamshedpur, Bramhanand Narayana Multispecial Hospital Jamshedpur, Medica Hospital Ranchi) were found to be segregating BMW properly following the BMWM Rules 2016 segregation color codes. Though there were some forms of color coded segregation in 14 other HCFs investigated, only a few of them were following the 1998 Rule segregation codes and most did not even have four different colored bins at the hospital premise. The two or a maximum of three colored bins (at few points) that they had were not necessarily of the prescribed colors. The situation was so unfortunate that the rest of the 14 HCFs had no segregation practice at all. This was the case for even government hospitals, CHCs and PHCs where bio-medical waste was often found mixed with municipal waste



FIGURE 3: BMW segregation at HCFs in Jharkhand

and dumped in the waste bin provided by theMunicipal Corporation within the hospital premises. In many cases, when the wards were visited, only single colored bins (either yellow or green or blue) were found.

There were some strange cases too, like MGM Jamshedpur had all proper colored liner bags dumped in the storage but no color coded bins were found anywhere near the waste generation points during the visit. Overall only 10 percent of the HCFs were found to be segregating waste according to the BMW Management Rules, 2016.



PHOTO: Improper waste segregation, mixing of bio-medical waste, use of random bins and storage of infectious (and hazardous) bio-medical waste open on ground observed at different HCFs visited during the study in Jharkhand

5.2. INFRASTRUCTURE TO MANAGE BIO-MEDICAL WASTE

Availability of appropriate and adequate infrastructure at the HCF premises ensures management of BMW and its absence directly points at the mismanagement. Bio-medical Waste Management Rules, 2016(and ammendment, 2018) have prescribed infrastructural requirements for color coded waste bins and liner bags, waste transportation facilities, sharp containers, etc.

Waste Bins: While the HCFs visited did have waste bins, not all of them had the prescribed and mandatory colors and not at all the generation points also. Many use random colored bins for their waste.Obviously, there was a dearth of liner bags and their mis-matching color coding as well. Such infrastructural lacunas initiate the problems of mixing of infectious waste, their exposure and sending them off to unknown destinations risking pulic health.



generation points

In 65% of the visited HCFs, the BMW bins were observed to be open exposing the waste to the environment. There were no waste bins at all in wards for 42% of the HCFs, in nursing stations for 13% of the HCFs, in laboratories for 39% of the HCFs and in OPDs for 6% of the HCFs.

Waste Transportation Trolleys: Trolleys ensure safe BMW intramural transportation from individual waste generation points to storage areas securing health safety of waste handlers, preventing infectious spread and exposure. In absence of padelled and covered trolleys, the waste is transported manually by carrying waste bins or bags. It was found during the study that many of the HCFs were managing their BMW without any trolleys (35%) and even 75% of those having trolleys (65%) were open.



FIGURE 6: Status of waste trasportation trolleys in % HCFs

the HCFs

Sharp Container: According to BMWM Rules, 2016, syringes should be either mutilated or needles should be cut and or stored in tamper-proof, leak-proof and puncture-proof containers for sharps storage. However, when investigated, no sharp containers were observed in 71% of the HCFs and only 10% had puncture proof sharp containers as mandated in the rule. Needle cutters were mostly found to be present in the HCFs but not at all waste generation points.



FIGURE 7: Status of Sharp containers in % of HCFs

FIGURE 8: Presence of Bio-hazard Symbol in waste handling infrastructures in % of HCFs

Also bio-hazard symbol labelling not found in most of the BMW handling infrastructures during the study. 'All the bags/ containers/ bins used for collection and storage of bio-medical waste, must be labelled with the symbol of Bio Hazard or Cytotoxic Hazard as the case may be as per the type of waste in accordance with the BMWM Rules, 2016', says the CPCB guideline for the rule implementation.



PHOTO: Improper waste bins, absence of liner bags or random colored liner bags, open trolleys and no bio-hazard symbol observed HCFs

5.3. INTRAMURAL TRANSPORT & STORAGE OF BMW

Transport of BMW: Almost all the HCFs visited were reported to have cleared their waste twice daily from different generation points within the facility. Intramural waste is handled by the facilities' waste handling staffs. Though there were trolleys in 65% of the visited facilities, the intramural waste transportation was observed and reported to be of somewhat mixed practice. Use of trolleys was very limited, rather big waste buckets, random containers and carts were found to be used for waste transport indiscriminately.

Storage of BMW: Though almost all of the visited facilities were found to have designated BMW storage areas, the storage conditions were shoddy and sub-standard. In the name of storage, random hospital corners are often found to be used to dump the waste. In some cases, open pits are dug and used for throwing waste. Even in cases where the HCF is connected to CBWTF, bio-medical waste was found to be stored in these storage corners in large amounts indicating irregular waste collection. BMW storage in plastic buckets, black liner bags or open dumping was frequently observed in the visited facilities. Only a few of the visited HCFs have separate color coded storage rooms. In 94% of the cases, these designated BMW storage areas did not have any compartmental storage facility for segregated waste. A huge 74% of them have open access, that is, not a lockable or closed area. None of these storage areas have the prescribed flooring. Not a single one was connected to water supply or any drainage routed to ETP. About 77% of the storages did not have any concrete walls and ceilings and 84% were not indicated with a labelled entrance or sign board. The storage sites were found to be approachable by vehicle in most cases.



FIGURE 9: Condition of Storage Infrastructure in the (%) HCFs



PHOTO: Bramhanand Narayana Hospital: Color coded, lockable, separate compartments for storage with IEC displayed but no bio-hazard symbol



PHOTO: 1) Bags with all categories of BMW along with unpacked openly thrown BMW dumped together at hospital corners; 2) BMW storage in black liner bags at random passage area of HCF; 3,4,5) BMW including yellow and red category waste dumped in municipal waste bin along with municipal waste in Deoghar District Hospital

5.4. BMW TREATMENT & DISPOSAL PRACTICES IN HCFS

Onsite treatment is also another grey area in the bio-medical waste management scenario of Jharkhand. Needle cutter is used in some hospitals and many were found to be mutilating the syringes manually. Only 29% of the visited HCFs have autoclave/microwave/hydroclave for pretreatment of labs and highly infectious bio-medical waste. Boilers are prevalently used for disinfecting in majority of the HCFs. Use of hypochlorite solution was also not observed and reported in 68% of the HCFs. In absence of adequate CBWTF facilities, deep bural pit and sharp pit methods are still widely followed in hospitals and were found in 55% and 52% of the studied HCFs. Segregation of liquid chemical waste at source, their pre-treatment or neutralisation prior to mixing and the final liquid waste treatment (ETP)at the facilities visited have effluent treatment plants (ETP), rest discharge their liquid waste along with the municipal waste water while 30 of the 31 visited HCFs have bed strengths equal to or more than 10.

Autoclave and incinerator (capacity 50 kg/hr) is used to pre-treat and final disposal of waste in MGM Jamshedpur hospital within the hospital premises. Rest of the government HCFs visited were found to be throwing their waste into municipal garbage vans or in unmanaged pits.

Only 26% of the HCFs are connected to CBWTF for sound treatment and disposal of BMW. All of these HCFs reported daily extramural collection of waste while it was observed in many cases during the investigation that huge amount of waste is lying in and around the storage corners. The problem majorly lies with unavailability and inadequate capacity of common BMW treatment facility in the state.







FIGURE 11: HCFs dispose BMW with municipal waste





FIGURE 12: HCFs connected to CBWTF







PHOTO: Open Deep burial pit with all kinds of biomedical waste thrown without any treatment. Domestic animals found strolling around.

5.5. POLICY & CAPACITY BUILDING

Interestingly, all of these HCFs reported verbally of having a nodal person to look after bio-medical waste – mostly someone from housekeeping or administration. Though 61% of the HCFs studied had bed strength of more than 30, yet only 12% of them have a separate bio-medical waste monitoring committee and 26% of the bio-medical waste management is looked after by an Infection Control Committee. Information on availability of BMW management policy was not furnished by the HCFs. Larger government hospitals did not provide any information and smaller ones, like the CHCs, PHCs and most of the small private HCFs responded of not having any policy for BMW management. No information could be accessed on the maintenance of BMW monitoring committee meeting minutes.

IEC materials regarding BMW management were found to be displayed in almost all the HCFs visited but not at all locations, like for example, only in 29% of the cases they are displayed at the waste storage sites. BMW management training for the healthcare professionals and waste handling staffs were reported to be provided only in 39% of the HCFs which are mostly annually.



5.6. RECORD MAINTENANCE

According to the BMWM Rules, 2016, HCFs shall maintain daily records of waste generation (categorically), storage and transport; operation records of incineration, autoclave/hydroclave/ microwave; immunisation and health check up records of healthcare workers and BMW handling staffs and major accidental reports. However, when investigated, not many of these HCFs were found to be maintaining their records properly apart from a few private star hospitals. Repeated entries of waste amounts in the daily waste collection register were also found in HCFs maintaining records. These registers are often maintained without signature or seal of any hospital authority or concerned person. Though all the visited facilities responded that they are reporting annually to SPCB and are also maintaining the records of needle stick injury and accident reporting, none of them have shown any reports to us during the study. JSPCB records say that only 38% of the HCFs in Jharkhand have submitted the annual report to the board in 2018. This shows the non-evidenced fabricated response from these facilities on record maintenance. None of these HCFs have any information on their monthly bio-medical waste records or BMW annual report in their websites.



FIGURE 18: Maintenance of records regarding BMW in HCFs



PHOTO: BMW Generation records as shown by some HCFs

5.7. OCCUPATIONAL SAFETY

Even the occupational safety of the healthcare workers was found to be highly compromised in majority of the HCFs visited. Healthcare workers in 39% and 19% facilities responded to not being immunised for Hepatitis B and Tetanus respectively. It was particularly found that though some of the personal protective equipments (PPE), like, gloves and masks are being worn by the healthcare professionals in private hospitals, none of it (use of PPE) is found in government facilities. Use of boots and headcaps was very rare. Also housekeeping staffs were never found to be wearing any PPE in most of the HCFs. None of these HCFs have any reporting system for needle stick injuries.



5.8. HAZARDOUS WASTE MANAGEMENT

There are no systems of hazardous waste segregation in any of these facilities and the waste is being dumped or sent off along with other bio-medical waste. Mercury medical instruments, like, thermometer and sphygmomamometer is being used in 100% of these facilities.

A VISIT TO THE CBWTF



BMW

PER DAY

Jamshedpur, Ranchi, Deoghar, Bokaro and Dhanbad while the same is located at Ramgarh district. Distance of Ramgarh from Deoghar is 227 kms and from Jamshedpur is 150 kms. As per the verbal information provided by this CBWTF, they treat about 200-250 kgs of biomedical waste per day which is half the amount reported in the JSPCB annual reports. A visit to the BGL site at Ramgarh and interaction with the workers revealed that the facility provides its waste collection and transportation services only to private HCFs twice or thrice in a week contradicting the hospital information which responded of a daily collection. This also violates the mandatory rule provisions of collecting and disposing waste in every 48 hours. Small maruti vans are used to carry waste from hospitals to the facility. The BMWM Rules, 2016 clearly mandate the type of vehicles to be used for collection and transportation of such waste. It needs to be checked whether the treatment equipments at the facility are following the updation requirements, standard protocols, emission and effluent criteria or not. No personal protective measures were found to be used by any of the workers observed working in the unit. The situation of this CBWTF itself showed the status of BMW management and disposal in the state.

As reported by the HCFs and the CBWTF namely M/s Bio Genetic Lab (P) Ltd. (BGL), it operates in all five cities of the current study, that is,





















PHOTO: Inside pictures taken during the study of Bio Genetic Lab CBWTF in Ramgarh. Waste carrier van, waste dumped in open, workers treating waste without using any PPE treatment

BAW IN THE OPEN DUMPYARDS



It is to be reminded that mixing of bio-medical waste with municipal waste was observed in many of the hospitals visited. When the Jamshedpur and Deoghar municipal waste dumping areas were visited, BMW waste in color coded liner waste bags was found dumped randomly along with other municipal waste. Rag pickers were found carrying these color coded bags to collect plastic bottles and metal sharps from the dumpyard. When asked, they casually replied, 'these are bags you will find with waste here. They often come with a poklane machine (rollers) to dump and bury these bags deep inside. They are hardy, so we take them out.'The questions remain, who are 'they'? CBWTF? Collective HCFs? Also, not to forget, much of the bio-medical waste in the state is still being collected in black liner bags which are impossible to disntiguish from the usual municipal waste.

Though illegal selling of parts of BMW in the open market could not be traced under the scope of the study, representatives from different HCFs confirmed that plastic and glass parts are sold to *kabadiwalas* (informal waste dealers). It is vividly understandable from both the photographic and informative findings of the current study that if much of the waste is not segregated, stored, collected or disposed and openly dumped in pits or even with municipal waste, then what could be the possible routes of these wastes. The parts which are recyclable and reusable will go down these routes illegally and those of no use will continue to infect and spread diseases from the open pits, municipal waste vans and dump sites.



PHOTO: Photographs from the municipal waste dump sites showing BMW dumped in color coded bags, their use for collecting plastic, glass and sharps from the dumpyard and the domestic animals grazing around

RECOMMENDATION

Sustainable management of biomedical waste (BMW) is societal and legal responsibility of people engaged in health-care activities. The Rules are preordained to improve the segregation, transportation, and disposal methods, to reduce environmental pollution so as to change the dynamic of BMW disposal and treatment in India. For effective disposal of BMW, there should be a joint teamwork with committed government support, infrastructure development, dedicated health-care workers and health-care facilities, continuous monitoring of BMW practices, strong administration, and regulatory bodies.

Some recommendations to improve the situation in Jharkhand BMW management:



BMW Inventory: Jharkhand does not have an inventory of bio-medical waste to estimate the amount of waste actually being generated from the state as well as their district wise quantification. It can be seen that the waste quantification is now largely based on the information provided by the HCFs which themselves are not aware of their waste owing to poor segregation, no record maintenance and illegal selling of part of this waste. In order to evalulate the capacity and service requirements of treatment facilities, it is important that the state comes up with a categorical and region specific waste inventory or else a top down approach of putting up a CBWTF without knowing its requirements will be a failure as it is right now.



Mapping of healthcare facilities: Mapping of at least the major healthcare facilities in the state is of utmost importance as to deduce the requirement of treatment facilities and route mapping for waste collection. This will also contribute to the realtime digital information availability on BMW generation, collection, treatment and disposal as is recommended in the CPCB guideline for the state.



Consideration of household and pharmaceutical biomedical waste and sanitary waste: Bio-Medical Waste Management Rules, 2016 apply to all persons generating, collecting, receiving, storing, transporting, treating, disposing or handling biomedical waste. Though the sources are majorly all types of healthcare/ laboratory/research facilities but the rules also address the waste generated from households and pharmaceuticals and are mandated to be managed and disposed properly. It is highly recommended that the inventories be inclusive of all types of bio-medical waste and sanitary waste and the state as well as the local authorities take immediate steps to address collection, storage, transport and treatment of such waste.

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Installation of adequate bio-medical waste treatment facilities or upgradation of the exisitng CBWTFs and ensuring their proper management is of immediate requirment for the state.



Strict monitoring and implementation of BMWM Rules, 2016: A number of stakeholders are deemed responsible for managing BMW at the state level including the authorities, occupiers of healthcare facilities and the treatment facilties. The authorites include State Health Department, State Pollution Control Board, Municipalities or Corporation, Urban Local Bodies and Gram Panchayats. District Level **Monitoring Committees** are mandated to be formed to look after the microlevel monitoring at the HCFs and CBWTFs. In a case of a failure like the state of Jharkhand, it needs a stricter top down management and implementation of the rules.

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Capacity building of the stakeholders at all levels, including regulatory authorities, local authorities, occupiers (HCF management), healthcare professionals, waste handling staffs, voluntary associations is required for developing and maintaining an inclusive and sustainable biomedical waste management system in the state.

SUMMARY OF FINDINGS

- Jharkhand is an Empowered Action Group (EAG) state with high infant mortality, high maternal mortality and high mortality due to infectious and contagious diseases. Health is one of the most important thrust areas of the state's development agenda.
- The state government information available in the public domain on bio-medical waste management in Jharkhand is misleading, misreported and grossly inadequate. No mandatory information regarding BMW of the occupiers (healthcare facilities) and CBWTFs were also found to be available in the public domain (website).
- Of the annual generation of 4,668 tonnes of bio-medical waste in the state, 2,754 tonnes are left untreated in Jharkhand which is 59% of the total waste generation.
- The state has severely inadequate treatment facilities for bio-medical waste. There are two operational CBWTFs in Jharkhand currently, both of which are far from many important districts of the state, thereby, not being able to cater to daily collection services. Only 18.7% of the state's generated BMW is being treated in the CBWTF.
- Captive treatment of bio-medical waste, like, deep burial pit and sharp pit encapsulation and inhouse incineration (or even the open burning chullas/ovens) are still widely practiced in the state including the government facilities.
- Only 10% of the visited healthcare facilities were found to be segregating their waste according to the Bio-medical Waste Management Rules, 2016 while segregation is the basic principle of the rule.
- The facilities were found to be lacking infrastructure and resources required to manage bio-medical waste as well. Absence of color-coded bins, color-coded liner bags, puncture-proof sharp containers, and closed trolleys were predominant across the visited facilities.
- Bio-medical waste was found to be stored in random hospital corners, often with unpacked waste, openly and with all kinds of waste mixed together. Storage areas were inappropriate in most cases without segregated compartments (94%), locked doors (74%), proper wall and ceiling (77%), signed entrance, water supply and effluent treatment connections (100%) and proper ventilation.
- Open burning and dumping of bio-medical waste in hospital wasteyards or in the municipal waste bin from the healthcare facilties was observed during the study.
- Record maintenance related to BMW was found to be poor. No records are being maintained of BMW generation and disposal in 55% healthcare facilities.
- Most health care professionals and waste dealing staffs were not provided BMW Management training.
- 39 per cent of the healthcare workers were reported as not being immunized, increasing occupational exposure risks. None of the healthcare staffs were found to be using personal protective equipments like gloves and masks in government HCFs.
- Only 26% of the surveyed HCFs were connected to CBWTF
- CBWTF (Bio Genetic Laboratories) at Ramgarh was visited and found to be operating in appalling condition. They were found to be collecting waste from HCFs by Maruti van and later segregating the waste in the open yard. None of the workers were found to be using any personal protective equipment.
- Bio-medical waste dumped openly or in color-coded lining bags as well was found in theMunicipal waste dumping sites of Jamshedpur and Deoghar. Such waste includes yellow waste (body parts), infected plastic and sharp waste including syringes, blood bags, etc. which can be reused directly.
- Jharkhand does not have a bio-medical waste inventory of the state.



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