International Journal of Emerging Knowledge Studies
Publisher's Home Page: https://www.ijeks.com/
Fully Open Access Research Paper

# Healthcare Waste Management in Uttar Pradesh (India)

**Prof. Dimpal Vij[1]* Sonal Narang[2]**

[1]Principal and Professor, A.K.P. (PG) College, Khurja (Bulandshahr), U.P., India.
[2]Research Scholar, M.M.H. College, Ghaziabad; Uttar Pradesh; India.
DOI: https://doi.org/10.70333/ijeks-02-11-s-017
*Corresponding Author: internationalconfrence2023@gmail.com

**Article Info: - Received** : 02 October 2023 **Accepted** : 25 November 2023 **Published** : 30 November 2023

Abstract

Healthcare wastes comprise the waste produced by healthcare services, biomedical research facilities, and medical laboratories. The rapid expansion of healthcare facilities has led to a substantial increase in medical waste generation. This surge presents challenges in managing biomedical waste, resulting in environmental pollution and public health concerns. There is a critical requirement for healthcare professionals to possess ample knowledge and a correct attitude toward bio-medical waste management. This paper aspires to examine the present-day medical waste handling and dumping practices at the Common Bio-medical Waste Treatment Facility in Uttar Pradesh, Bharat. The country has firm rules for the proper processing of biomedical waste (Bio-Medical Waste Management Rules 2016) which requires all facilities to implement necessary measures to ensure that biomedical waste is managed in a manner that minimizes any adverse effects on human and environmental health. This paper reviews ongoing methods for managing biomedical waste in the state and emphasizes the challenges faced. It also offers recommendations for turning this waste into a valuable resource rather than simply viewing it as a problem.

**Keywords:** *Healthcare waste; Healthcare Waste Management, Bio-Medical Waste Management, Uttar Pradesh.*

© 2023 Prof. Dimpal Vij and Sonal Naran., This is an open access article distributed under the Creative Commons Attribution License(https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.

## 1. INTRODUCTION

Waste management is a vital concern of government officials, states, and local governments. Despite being less frequently addressed than plastic and electronic waste, biomedical waste requires considerable attention. According to **(Guidelines for Management of Healthcare Waste as per Biomedical Waste Management Rules, 2016)**, 'Biomedical waste refers to any waste produced during the processes of diagnosing, treating, or immunizing humans or animals. This category of waste includes not only materials generated in clinical settings but also waste originating from research activities related to healthcare practices. Additionally, it includes waste resulting from the production and testing of

biological products, such as vaccines, and blood products. The proper management of biomedical waste is essential to reduce risks to public health and the environment.' Medical waste is measured as hazardous waste that may lead to infections, genital deformities, cholera, hepatitis, AIDS, asthma, hormonal-triggered cancers, etc. Unfitting medical management has a forceful consequence on human beings. Healthcare workers, patients, workers in support services, visitors, etc. are the people in danger of healthcare harmful waste.

Research comparing biomedical waste generation across states during the COVID-19 pandemic indicates that Uttar Pradesh, the most populous state with 18 divisions and 75 districts, ranked fifth in biomedical waste production for 2020, according to reports from the Central Pollution Control Board (CPCB). According to the study published in the journal Research and Health Services & Regions, the average daily generation of biomedical waste (in tonnes) was highest in Maharashtra, at 27.75 tonnes, Tamil Nadu at 13.4 tonnes, and Uttar Pradesh at 11.93 tonnes, Tamil Nadu at 13.4 tonnes, and Uttar Pradesh at 11.93 tonnes reflecting data from both pre-COVID-19 and post-COVID-19 periods. **(Bagwan, 2023)**


**Fig-1:** Geographical location of Uttar Pradesh, India
**Source: (mapsofindia.com)**

Given the recent incidents of negligent handling of biomedical waste in healthcare facilities in Uttar Pradesh, there is a pressing need for proper management of BMW to safeguard the environment and stop the transmission of infections. A key element in reducing diseases is the safe destruction and disposal of biomedical waste. Even rag pickers are often worse affected, as they unknowingly scrabble through hazardous materials while attempting to salvage items for resale. Sometimes unethical and illegal reuse results dangerously and even causes death.

Most of the districts in the state experience lots of constraints to manage healthcare waste efficiently. Only a few stakeholders of healthcare facilities are adequately informed about the procedures essential for proper waste management. Therefore, it falls to both central and state governments to establish a strategy for the regulated disposal of waste by healthcare workers and to ensure that healthcare centres collaborate

in managing waste effectively. And this requires a national approach involving relevant ministries, medical associations, and other key stakeholders.

In this context, this paper seeks to evaluate the current status of healthcare waste management in Uttar Pradesh and provide actionable recommendations that could enhance management practices in this field.

## 2. REVIEW OF EXISTING LITERATURE

**(Ananth, Prashanthini, & Visvanathan, 2010)** reviewed the effectiveness of healthcare waste management in 12 developing Asian nations and examined aspects that could drive improvements in the current HCWM situation. The role of governments and other stakeholders is understood and calls for changes in their mindset. This study highlighted three areas: budget support, technology, and policy development.

**(Bagwan, 2023)** suggested that advanced online monitoring technologies, a Geographical Information System, and real-time tracking systems can significantly aid in the sustainable management of biomedical waste generation in Maharashtra throughout the COVID-19 pandemic.

**(Bansod & Deshmukh, 2023)** systematically reviewed the importance of biomedical waste management. This study aims to provide evidence-based information and explain the importance of joint efforts alongside dedicated government backing in financing and infrastructure development for the effective disposal of BMW.

**(Das, Islam, Billah, & Sarker, 2021)** discussed the various healthcare solid waste management strategies employed across multiple countries and the challenges encountered in implementing these solutions, particularly during the COVID-19 pandemic. In addition, it was concluded that proper HCWM could enhance national economies and promote sustainable development.

**(Oli, et al., 2016)** analyzed data collected from selected government and private healthcare workers across various hospitals between April and July 2013, to assess their participation in healthcare waste management in public and private institutions. The analysis, conducted using SPSS version 16.0, revealed that healthcare workers in government hospitals possess a greater understanding of HCWM systems than those in private hospitals. However, the overall effectiveness of committees in both hospital types was found to be lacking.

**(Thakur & Anbanandam, 2017)** focused on only one common biomedical waste treatment facility in Uttarakhand, with data collected over a two-year period (2013 and 2014). The primary aim of this study was to gather information regarding HCDW practices at MPCC Ltd. Uttarakhand, India and modelled the volume of HCW collected at the facility.

## 3. OBJECTIVE OF THE STUDY

- To explore the HCWM scenario in Uttar Pradesh, India.
- To suggest enhancements in the management practices for healthcare waste.

## 4. RESEARCH METHODOLOGY

Recognizing the significance of the study and its potential impact on future decisions, careful selection of information sources is essential. Therefore, the sources are restricted to organizations directly related to healthcare waste management, including CPCB (Central Pollution Control Board), UPPCB (Uttar Pradesh Pollution Control Board), and MPCC (Medical Pollution Control Committee).

Furthermore, published literature in academic journals and relevant policies on healthcare waste management serve as important secondary sources of information.

## 5. HEALTHCARE WASTE MANAGEMENT STATUS IN UTTAR PRADESH

There were 208 operational CBWTFs in India in 2020 as per the Ministry of Environment; Forest and Climate Change. These facilities had a combined capacity of 1167.4 Tonnes per Day (TDP). Data from State Pollution Control Boards/ Pollution Control Committees (SPCBs/PCCs) indicated that approximately 656 TPD of biomedical waste was generated in 2020, with 590 TPD treated, resulting in an efficiency rate of 89.94%. Additionally, there was an increase in biomedical waste generation by 84.61 TPD from May 2020 to February 2022, primarily due to the COVID-19 pandemic.

Out of 208 operational Common Biomedical Waste Treatment Facilities (CBWTFs) in India, 21 are located in Uttar Pradesh.

**Table-1:** State-wise breakdown of Operational CBWTFs in India

| Name of State and Union Territory | Operational CBWTFs |
|---|---|
| Andaman Nicobar | Nil |
| Andhra Pradesh | 12 |
| Arunachal Pradesh | Nil |
| Assam | 1 |
| Bihar | 4 |
| Chandigarh | 1 |
| Chhattisgarh | 4 |
| Daman & Diu and Dadra & Nagar Haveli | Nil |
| Delhi | 2 |
| Goa | Nil |
| Gujarat | 20 |
| Haryana | 11 |
| Himachal Pradesh | 3 |
| Jharkhand | 4 |
| Jammu & Kashmir | 3 |
| Karnataka | 25 |
| Kerala | 1 |
| Ladakh | Nil |
| Lakshadweep | Nil |
| Madhya Pradesh | 12 |
| Maharashtra | 30 |
| Manipur | 1 |
| Meghalaya | 1 |
| Mizoram | Nil |
| Nagaland | Nil |
| Odisha | 6 |
| Puducherry | 1 |
| Punjab | 5 |
| Rajasthan | 11 |
| Sikkim | Nil |
| Tamil Nadu | 10 |
| Telangana | 11 |
| Tripura | Nil |
| Uttarakhand | 2 |
| Uttar Pradesh | 21 |
| West Bengal | 6 |
| DGAFMS | Nil |
| **Total** | **208** |

**Source:** **(Central Pollution Control Board (http://surl.li/gtrrqx))**

As per the annual reports by SPCBs and PCCs by Uttar Pradesh to CPCB for the years 2011 to 2021 shows a continuous increase in the healthcare facilities of the state. And only in a year i.e., 2020 to 2021, it showed an increment of 19.54% from 31,474 HCFs to 37,625 HCFs.

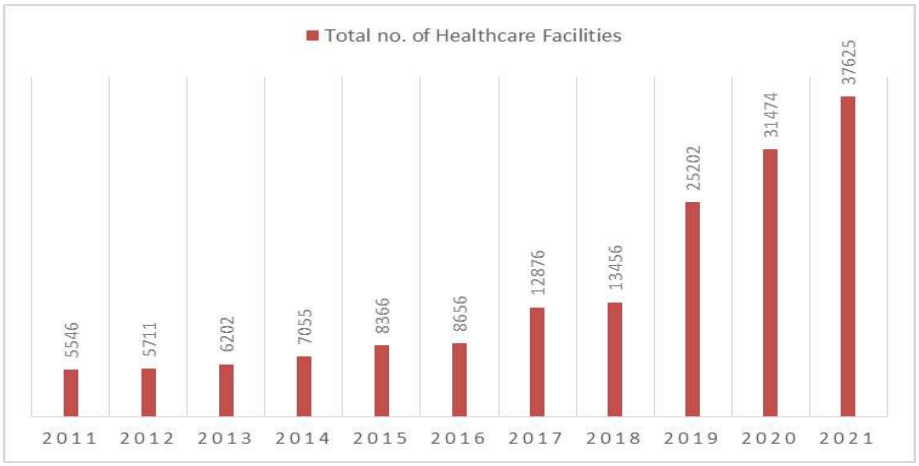


**Fig-2:** Year-wise status of Healthcare Facilities (HCFs) in Uttar Pradesh
**Source:** **(Various Annual reports of CPCB (https://cpcb.nic.in/status-of-bmw-management/ ))**

## 6. GOVERNMENT AND PRIVATE POLICIES

The guidelines formulated by the Ministry of Environment and Forests (MoEF), Government of India, under the "Biomedical Waste (Management and Handling) Rules, 1998", establish a standardized framework and a national code of practice. These regulations stipulate that the person responsible for any institution generating biomedical waste- such as hospitals; nursing homes, dispensaries, pathological labs, and blood banks- is accountable for implementing essential measures to manage this waste safely, thereby protecting both human health and the environment. **(Krishna & Chaurasia, 2014)**

The BMW 1998 rules underwent amendments in the years- 2000,2003,2011,2016,2018 and 2019. **(Chandra & Bhat, 2023)** According to BMWM Rules 2016, only pre-treatment and segregation are done in the hospital and the final disposal and recycling are done by CBMWTFs. The hospitals have been provided the colour-coded bags with their names inscribed over them with logos for bio-medical hazards.

A software application named "COVID19BWM" was also introduced as a vital tool to monitor transparency and provide real-time data on waste generation and disposal of COVID-19 biomedical waste at numerous HCFs in May 2020. The CPCB developed this application in an acknowledgement of directives from the National Green Tribunal (NGT) by which biomedical waste specifically of COVID-19 can be tracked and monitored. **(Shagun, 2020)**

According to Shri Ashwini Kumar Choubey, Minister of State, Ministry of Environment, Forest & Climate Change in Lok Sabha on 21 March 2022 **(Common Bio-medical Waste Treatment and Disposal Facility, 2022)**(PIB Delhi), 'To enhance the capabilities of existing Common Biomedical Waste Treatment and Disposal Facilities (CBWTFs) to manage the increased volume of biomedical waste, the Central Pollution Control Board (CPCB) has developed technical guidelines. These guidelines recommend extending the operational hours of CBWTFs and utilizing specialized incinerators to treat and dispose of yellow colour-coded waste that exceeds the current capacity of these facilities. As a result, biomedical waste is processed and disposed of using dedicated treatment facilities managed by healthcare providers.'

The Uttar Pradesh Pollution Control Board: UPPCB and the Medical Pollution Control Committee: MPCC, in collaboration with the State Health Department, have been directed to evaluate the necessity for establishing Common Biomedical Waste Treatment Facilities (CBWTFs) for the effective collection, disposal and treatment of bio-medical waste. This evaluation will include conducting gap analysis studies to identify discrepancies in the generation of biomedical waste and the available treatment facilities.

Moreover, the Ministry of Environment; Forest and Climate Change is implementing a program called 'Creation of Management Structure for Hazardous Substances' which provides federal support of up to ₹1Crore for the establishment of CBWTF projects that are endorsed by the State or Union Territory Government.

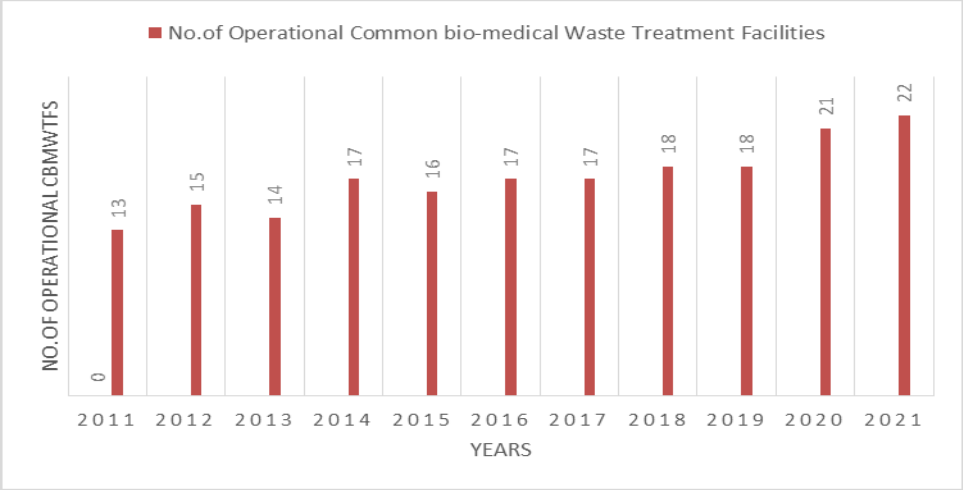


**Fig-3:** Year-wise Status of CBMWTFs in Uttar Pradesh from 2011 to 2021
**Source:** (Various Annual reports of CPCB (http://surl.li/njgujy))

As shown in table 1, number of CBWTF varies in various States/UTs for a particular year 2020. In figure 3, number of operational CBWTFs of a particular state Uttar Pradesh for last decade is shown. The number of CBWTFs may depends on many factors, such as number of HCFs, population density, accessibility of CBWTFs etc., which is increasing though slowly in the state as per government rules.

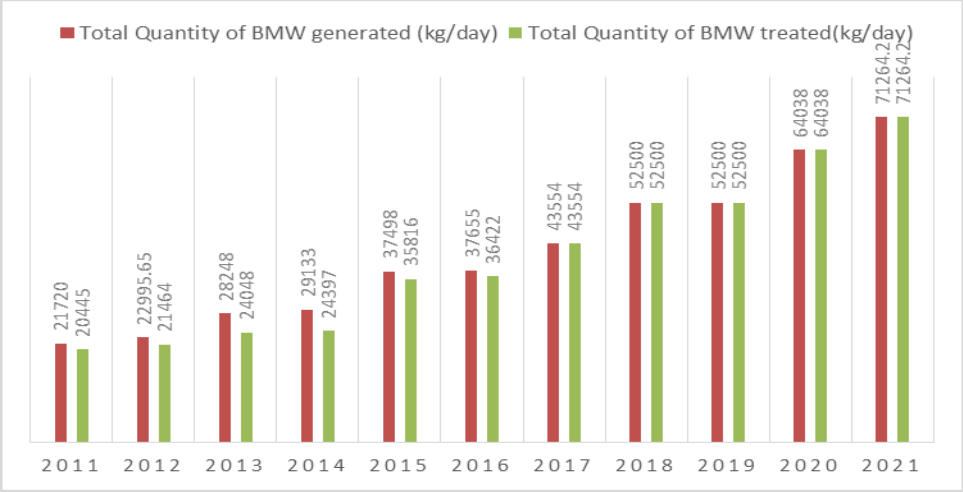


**Fig-4:** Generation and Treatment of BMW during the years 2011-2021
**Source:** (Various Annual reports of CPCB (http://surl.li/bglvti))

As shown in Figure 4, biomedical waste generated was also treated and disposed of in an environmentally friendly manner in Uttar Pradesh, especially after the BMWM Rules, 2016 amendment. It is found that since 2017, there has been no disparity between the total generation of bio-medical waste and treatment of the total bio-medical waste in the state.

## 7. RECOMMENDATIONS

Managing biomedical waste is a multifaceted activity that requires the involvement of numerous stakeholders, both within the healthcare sector and beyond. In addition to healthcare providers, various organizations play a major role in BMWM.

To manage BMW sustainably, advanced online monitoring technologies and safe handling

of bio-medical waste are essential for effective policy-making. Along with the above organizations and technologies used by respective governments, the following points are recommended.

- Governments and private hospitals should be fined for dumping biomedical wastes.
- Despite municipalities having effective biomedical waste management systems in place, healthcare facilities still encounter numerous challenges. One major issue is the proper separation of waste at the time of generation in patient rooms. This could be alleviated by using visual aids with clear instructions on waste segregation techniques on or near trash bins.
- A reliable and safe method for handling BMW includes segregation into colour-coded bags or containers and its collection and disposal should be ensured at any cost.
- An effective method of managing biomedical waste can be achieved through a collaborative effort that includes strong government support for financial and infrastructural development, committed healthcare workers, strict legislation, monitoring of biomedical waste management procedures, and powerful regulatory bodies. **(Chandra & Bhat, 2023)**
- By implementing thoughtful planning and management, the risks associated with biomedical waste can be mitigated. This not only reduces waste generation but also controls overall waste management expenditure. Furthermore, training and motivation of healthcare personnel at all levels are very important these days to improve the situation considerably.
- And proper training and awareness programmes should be organized for the general public especially youth of the state on the impact of bio-medical waste if mixed with normal/ green waste.

## 8. CONCLUSION

Biomedical waste is not confined to healthcare facilities; significant amounts also come from households. Therefore, there should be a joint effort with dedicated government support.

The introduction of laws alone is insufficient for the effective disposal of biomedical waste. The development of a healthcare system that creates awareness and promotes effective implementation of existing biomedical waste management guidelines among all healthcare personnel has primary significance. It requires special treatment and must not be combined with municipal waste. Previous studies have indicated that incineration is the most effective technology for discarding medical waste. Harmful waste ought to be placed in yellow leak-proof containers and should be labelled with international infectious substances. **(Acharya, Gokhale, & Joshi, 2014)**. The successful implementation of the biomedical waste program relies on the willingness and cooperation of all sections of stakeholders; which may be households, healthcare workers, children, and employees of private clinics and, nursing homes. The proper training and awareness campaigns should be organized to know the importance of segregation of biomedical waste in yellow bags instead of mixing it with other general waste. Effective collection of hospital waste will decrease the volume of infectious wastes, thereby reducing treatment costs. This is the need of an hour now to pause and think over the matter because we need to understand that waste management of hospitals as well as households and unregistered nursing homes is of great concern. We need properly designed and applied innovative measures to manage waste especially healthcare waste considering it as a social responsibility. Correct procedures will help to protect healthcare workers, patients, and the local community like educating kids about biomedical waste and women about disposing of sanitary pads separately and other measures should be adopted to spread more awareness regarding the appropriate handling, treatment, and disposal of biomedical waste.

Given the volume of biomedical waste generated in Indian states like Uttar Pradesh, it is crucial to prioritize this issue. All participants involved in biomedical waste management must commit to ensuring a cleaner and greener environment.

## REFERENCES

Acharya, A., Gokhale, V. A., & Joshi, D. (2014, January). Impact of Biomedical Waste on City Environment: Case Study of Pune, India. IOSR Journal of Applied Chemistry (IOSR-JAC),

6(6), 21-27. Retrieved October 22, 2023

Ananth, A. P., Prashanthini, V., & Visvanathan, C. (2010). Healthcare waste management in Asia. Waste Management, 154-161. doi:http://dx.doi.org/10.1016/j.wasman.2009.07.018

Bagwan, W. A. (2023). An investigation of the bio-medical waste produced in India during the COVID-19 pandemic and Maharashtra state(pre-COVID-19 and post-COVID-19) analysis: a GIS-based approach. Research in Health Services & Regions, 2(1), 2-18. doi:https://doi.org/10.1007/s43999-023-00023-9

Bansod, H. S., & Deshmukh, P. (2023). Biomedical Waste Management and Its Importance: A Systematic Review. Cureus, 15(2).

Chandra, M., & Bhat, P. (2023, March-April). Latest Biomedical Waste Management Guidelines. International Journal of Medical Science and Current Research, 6(2), 854-862. Retrieved October 22, 2023

Common Bio-medical Waste Treatment and Disposal Facility. (2022, March 21). Retrieved from Ministry of Environment, Forest and Climate Change: https://pib.gov.in/PressReleasePage.aspx?PRID=1807735

Das, A. K., Islam, M. N., Billah, M. M., & Sarker, A. (2021). COVID-19 pandemic and healthcare solid waste management strategy – A mini-review. Science of the Total Environment. doi:https://doi.org/10.1016/j.scitotenv.2021.146220

(2016). Guidelines for Management of Healthcare Waste as per Biomedical Waste Management Rules. Central Pollution Control Board. Retrieved from https://cpcb.nic.in/uploads/Projects/Bio-Medical-Waste/Guidelines_healthcare_June_2018.pdf

Krishna, V., & Chaurasia, S. (2014, August). Bio Medical Waste Management in Varanasi City, (U.P.), India. International Journal of Engineering Research and Development, 10(8), 12-18. Retrieved October 22, 2023

Oli, A. N., Ekejindu, C. C., Adje, D. U., Ezeobi, I., Ejiofor, O. S., Ibeh, C. C., & Ubajaka, C. F. (2016). Healthcare waste management in selected government and private hospitals in Southeast Nigeria. Asian Pacific Journal of Tropical Biomedicine, 6(1), 84-89. doi:http://dx.doi.org/10.1016/j.apjtb.2015.09.019

Shagun. (2020, August 4). Use app to monitor COVID-19 biomedical waste, SC to civic bodies. Retrieved from DownToEarth: https://www.downtoearth.org.in/news/environment/use-app-to-monitor-covid-19-biomedical-waste-sc-to-civic-bodies-72649

Thakur, V., & Anbanandam, R. (2017). Management practices and modeling the seasonal variation in health care waste A case study of Uttarakhand, India. Journal of Modelling in Management, 12(1), 162-174. doi:http://dx.doi.org/10.1108/JM2-08-2015-0058

**Cite this article as:** Prof. Dimpal Vij and Sonal Narang., (2023). Healthcare Waste Management in Uttar Pradesh (India). International Journal of Emerging Knowledge Studies. 2(11), pp. 143-150. https://doi.org/10.70333/ijeks-02-11-s-017