



Shiksha Mandal's  
**G. S. College of Commerce, Wardha**  
(An Autonomous Institution)

A Research Project On

**A STUDY ON BIOMEDICAL WASTE MANAGEMENT PRACTICES IN  
HEALTHCARE CENTERS OF WARDHA DISTRICT**



**NATIONAL SERVICE SCHEME (NSS)**

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## ACKNOWLEDGEMENT

We, the NSS Volunteers of **G.S. College of Commerce, Wardha**, take great pride and satisfaction in presenting this project titled “A Study on Biomedical Waste Management Practices in Healthcare Centers of Wardha District”, undertaken under the National Service Scheme (NSS) Department.

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**NSS Volunteers**  
G.S. College of Commerce, Wardha

## ABSTRACT

Biomedical waste management has emerged as a critical public health and environmental concern due to the increasing generation of hazardous waste from healthcare activities. The present study titled “**A Study on Biomedical Waste Management Practices in Healthcare Centers of Wardha District**” aims to examine the level of awareness, training, implementation practices, and challenges associated with biomedical waste management among healthcare facilities in Wardha District. The study covers various types of healthcare centres including government hospitals, private hospitals, clinics, diagnostic laboratories, and nursing homes. Primary data were collected through a structured questionnaire from healthcare professionals such as doctors, nurses, and laboratory technicians.

The findings reveal a high level of awareness regarding Biomedical Waste Management Rules among respondents, with the majority having received formal training. Most healthcare facilities follow essential practices such as segregation of waste at the point of generation, use of color-coded bins, display of biohazard symbols, maintenance of disposal records, and regular collection and transportation of waste. However, certain gaps were observed in consistent implementation, including occasional lapses in segregation, incomplete use of personal protective equipment, and infrastructural limitations. Key challenges identified include lack of training in some cases, inadequate infrastructure, staff shortages, and financial constraints.

The study concludes that although biomedical waste management practices in Wardha District are generally satisfactory and supported by positive attitudes among healthcare personnel, continuous training, strict monitoring, improved infrastructure, and a comprehensive implementation approach are necessary to achieve full compliance. Strengthening these measures will contribute significantly to reducing health risks and environmental hazards associated with improper biomedical waste disposal.

**Key Words:** Biomedical Waste Management, Wardha District, Healthcare centers.

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## LIST OF ABBREVIATION

1. **BMW**: Biomedical Waste.
2. **PPE**: Personal Protective Equipment.

### **SPECIAL APPRECIATION LIST**

We sincerely appreciate and acknowledge the commendable efforts, commitment, and significant contributions of the following students in ensuring the successful accomplishment of this project.

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# **CHAPTER I: INTRODUCTION**

## INTRODUCTION

The healthcare sector plays a vital role in improving the quality of human life by preventing, diagnosing, and treating diseases. Healthcare center produces a lot of waste in addition to providing medical care, some of this material is toxic and is referred to as biological waste. Sharps, pharmaceutical waste, chemical waste, infectious waste, pathological waste, and other materials polluted during medical procedures are all considered biomedical waste. In addition to causing environmental degradation, improper treatment and disposal of such waste can put patients, healthcare professionals, trash handlers, and the general public at considerable risk for health problems.

The contagious and poisonous nature of biomedical waste sets it apart from regular municipal waste. Hepatitis B, hepatitis C, HIV/AIDS, and other hospital-acquired infections could spread if it is not treated scientifically. Some of the main repercussions of inadequate biomedical waste management include contamination of soil and groundwater, injuries from sharp objects like needles and blades, and pollution of the air and water from inappropriate treatment. Therefore, every healthcare facility has a moral and ethical responsibility in addition to a legal need to manage biomedical waste effectively.

In India, the quantity of biomedical waste generated daily has increased substantially due to the expansion of healthcare infrastructure, population growth, and advancements in medical services. According to recent government reports, India generates approximately 700–800 tonnes of biomedical waste per day (Drishti IAS 2024), reflecting the growing burden on waste management systems. Among Indian states, Maharashtra is one of the leading contributors, producing roughly 70–80 tonnes per day, owing to its large population, extensive healthcare network, and high patient load. These figures highlight the urgent need for efficient biomedical waste management systems at both national and state levels, especially in districts with expanding healthcare services.

The Biomedical Waste Management Rules, 2016, which require appropriate waste segregation at the source, colour-coded collection, safe storage, transportation, treatment, and environmentally sound disposal of biomedical waste, were developed by the Indian government in response to the growing concern. These regulations priorities reducing waste production, guaranteeing workplace safety, educating healthcare professionals, and keeping an eye on compliance. However, the awareness, attitudes, and behaviours of healthcare

professionals as well as the availability of sufficient infrastructure are crucial to the proper execution of these regulations.

Despite the presence of regulations, a number of studies have found deficiencies in biological waste management procedures, especially at rural and district-level healthcare centers. Inadequate waste segregation, infrequent training programs, a lack of safety gear, poor record keeping, and insufficient supervision are common problems. In areas where healthcare institutions differ greatly in terms of size, ownership, and funding, these issues are frequently more severe.

Maharashtra's Wardha District is a major hub for rural health outreach, medical education, and healthcare services. Government hospitals, basic health centers, private hospitals, nursing homes, and clinics serving both urban and rural populations are located in the district. The amount of biomedical waste produced in the district has expanded along with the number of patients, medical procedures, and diagnostic activities. To safeguard the environment and public health in such a context, safe and effective biological waste disposal is essential.

In this regard, the current study aims to investigate the biomedical waste management procedures used by medical facilities in Wardha District. The study's objectives are to determine the degree of adherence to recommended biological waste management regulations, gauge healthcare workers' knowledge and training, and pinpoint weaknesses and difficulties in the current system. The study aims to offer practical insights and suggestions that may assist legislators, hospital administrators, and healthcare professionals in enhancing biomedical waste management and fostering a safer and cleaner healthcare environment in Wardha District by examining existing practices and issues.

- **Objectives**

1. To study the existing biomedical waste management practices followed by healthcare centers in Wardha District.
2. To assess the level of awareness and knowledge regarding biomedical waste management among healthcare personnel.
3. To identify challenges and constraints faced by healthcare Centre in implementing biomedical waste management rules.

4. To suggest measures for improving biomedical waste management practices in Wardha District.

- **Hypothesis**

**H<sub>01</sub>:** There is no statistically significant relationship between training, awareness, and biomedical waste management practices among healthcare centers in Wardha District.

**H<sub>11</sub>:** There is a statistically significant relationship between training, awareness, and biomedical waste management practices among healthcare centers in Wardha District.

**H<sub>02</sub>:** There is no impact of use of PPE on health risk.

**H<sub>12</sub>:** There is impact of use of PPE on health risk.

**CHAPTER II: LITERATURE  
REVIEW**

## LITERATURE REVIEW

- 1. Hossein Nematollahi et.al (2025):** In order to examine present issues and developments in medical waste management, especially during and after the COVID-19 epidemic, this study used a systematic review methodology. With an emphasis on technical performance, environmental effect, economic viability, and sustainability, the assessment assessed both established and cutting-edge waste treatment methods. To evaluate changes in waste generation, treatment effectiveness, and global differences in infrastructure and resources, data from published research were combined. The research sought to identify gaps, constraints, and future directions for creating workable and sustainable medical waste management strategies by contrasting current procedures with cutting-edge alternatives.
- 2. Himani Bansod et.al (2023):** To evaluate biomedical waste management procedures in healthcare settings, a descriptive cross-sectional study will be carried out. In compliance with the Biomedical Waste Management Rules, 2016, it will concentrate on the identification, separation, treatment, and disposal of biomedical waste. In order to assess healthcare professionals' knowledge, attitudes, and behaviors surrounding BMW management, data will be gathered through structured questionnaires, observational checklists, and interviews. Infrastructure, color-coded containers, labeling, transportation, and treatment facilities will all be evaluated. In order to promote ecologically safe and efficient biomedical waste disposal methods, the gathered data will be examined to ascertain conformity with current rules and to identify implementation gaps.
- 3. Sang Lee et.al (2022):** The study adopted a mixed-methods research approach to identify and prioritize factors influencing effective medical waste management for sustainable green healthcare. The methodology comprised a survey of hospital employees involved in medical waste handling to gather primary data after a comprehensive assessment of the literature to identify important factors. The elements were ranked and prioritized according to their relative relevance using the Analytic Hierarchy Process (AHP). Expert consultations were also held in order to verify the results and evaluate their usefulness. In order to improve medical waste management, this integrated strategy offered both practical relevance and analytical rigor. practices.
- 4. Laksh Agrawal et.al (2022):** This study will adopt a cross-sectional study design conducted among households in rural and urban areas attached to the health centers of the institution. The study population will include residents from selected households in both settings. Data will be collected through direct household visits, on-site observation, and personal interviews using a

structured questionnaire. Information will be gathered on participants' knowledge, attitudes, perceptions, and practices related to domestic biomedical waste segregation, treatment, and disposal. The collected data will be systematically compiled and subjected to appropriate statistical analysis to derive meaningful results and conclusions.

5. **Divya Rao et.al (2018):** In order to evaluate healthcare workers' knowledge, attitudes, and behaviors (KAP) about biomedical waste management, this study used a cross-sectional descriptive methodology. Physicians, nurses, lab technicians, and support personnel participated in the study, which was carried out in a tertiary care hospital. A standardized questionnaire that focused on BMW management procedures and practices was used to gather data. In order to assess the need for focused training and awareness initiatives, the gathered responses were examined to find gaps in theoretical knowledge and practical application across staff categories.
6. **Nikhil Dhande et.al (2017):** Biomedical waste (BMW) and its regulations are well known to most participants; yet, their understanding of appropriate BMW management is frequently lacking or inaccurate. Inadequate training and oversight raise the risks to the environment and healthcare personnel since careless handling can result in infectious disease transmission and needlestick injuries. As a social responsibility and legal duty, safe BMW management necessitates the rigorous application of BMW and occupational safety regulations, as well as frequent audits and methodical monitoring to guarantee adherence. Immunization, health insurance, and post-exposure care must be included in occupational health programs, and thorough training programs should address waste segregation, disposal techniques, and the use of personal protective equipment. In the end, efficient BMW management safeguards patients, healthcare professionals, and the environment.

**CHAPTER III: RESEARCH  
METHODOLOGY**

## **RESEARCH METHODOLOGY**

The present study adopts a descriptive and analytical research design. The descriptive design is used to systematically describe the existing biomedical waste management practices followed by healthcare centres. It helps in understanding the current level of awareness, segregation methods, disposal practices, and compliance with biomedical waste management rules. The analytical design is used to examine relationships between variables and to measure the impact of factors such as training, awareness, and infrastructure on the effectiveness of biomedical waste management. Thus, the study not only describes the situation but also analyses the influencing factors through statistical techniques like regression.

### **Area of Study**

The study was conducted in healthcare centers located in **Wardha District**, Maharashtra. Wardha district comprises a mix of urban and semi-urban healthcare institutions, including government hospitals, private hospitals, clinics, nursing homes, and diagnostic laboratories. These facilities generate biomedical waste on a daily basis and are required to comply with the Biomedical Waste Management Rules, 2016. The selection of Wardha district provides a focused geographical area for examining the implementation and effectiveness of biomedical waste management practices.

### **Population of the Study**

The population of the study includes healthcare professionals working in different healthcare establishments of Wardha district. This consists of doctors, nurses, laboratory assistants, and other paramedical staff who are directly or indirectly involved in handling biomedical waste. These individuals play a crucial role in waste segregation, collection, storage, and disposal processes. Since they are directly engaged in biomedical waste handling, their responses provide reliable insights into the actual practices followed within healthcare centers.

### **Sampling Technique**

The study uses Simple Random Sampling as the sampling technique. In this method, every individual in the population has an equal chance of being selected. A list of healthcare professionals from selected healthcare centers was prepared, and respondents were chosen randomly. This technique helps in minimizing selection bias and ensures fairness in the

selection process. It also enhances the representativeness of the sample, making the findings more reliable and generalizable within the district.

### **Sample Size**

The total sample size of the study is 30 respondents. These respondents were selected from different types of healthcare centers, including government hospitals, private hospitals, clinics, and nursing homes. Although the sample size is relatively small, it provides a manageable and focused group for detailed analysis. The selected respondents represent different professional categories such as doctors, nurses, and laboratory assistants, which ensures diversity in perspectives regarding biomedical waste management practices.

### **Sources of Data**

The study is based on both primary and secondary data sources to ensure comprehensive analysis.

- 1. Primary data** were collected directly from respondents using a structured questionnaire. This allowed the researcher to gather first-hand information regarding awareness levels, training, infrastructure availability, segregation practices, and challenges faced in biomedical waste management.
- 2. Secondary data** were collected from published sources such as government reports, research articles, official biomedical waste management guidelines, journals, and online resources. These sources provided background information, legal frameworks, and comparative insights to support the findings of the primary data.

### **Statistical Tools Used**

Regression analysis was used as the main statistical tool to determine the impact of independent variables (such as awareness, training, and infrastructure) on the effectiveness of biomedical waste management practices. Regression analysis helps in identifying which factors significantly influence proper waste management and the strength of their relationship with the dependent variable.

## **Ethical Considerations**

Ethical standards were maintained throughout the research process. Informed consent was obtained from all respondents before collecting data. Participants were assured that their responses would remain confidential and would be used only for academic purposes. Participation in the study was voluntary, and respondents were given the freedom to withdraw at any stage. Personal identification details were not disclosed to maintain privacy and confidentiality.

**CHAPTER IV: DATA  
INTERPRETATION & HYPOTHESIS  
TESTING**

## DATA INTERPRETATION & HYPOTHESIS TESTING

### 1. Type of Healthcare centers

Clinics represent the highest proportion of healthcare centers in Wardha District (30%), followed by private hospitals (26.7%) and government hospitals (23.3%). Diagnostic laboratories account for 13.3%, while nursing homes constitute the smallest share (6.7%). This distribution indicates that biomedical waste is generated not only by hospitals but also significantly by smaller facilities such as clinics and laboratories. Therefore, effective biomedical waste management strategies must cover all facility types, ensuring proper segregation, staff training, regular monitoring, and strict compliance to protect environmental and public health.

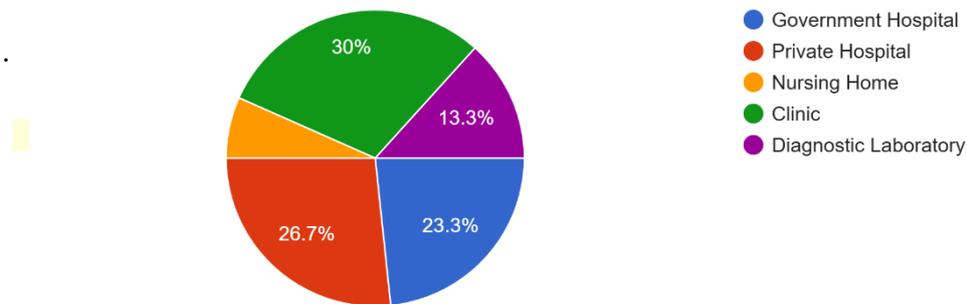
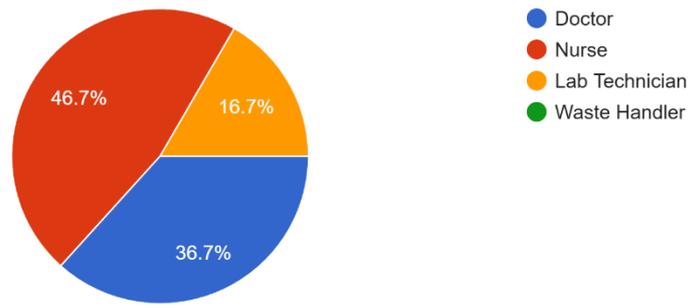


Figure 1: Type of Healthcare centers

### 2. Designation of Respondent

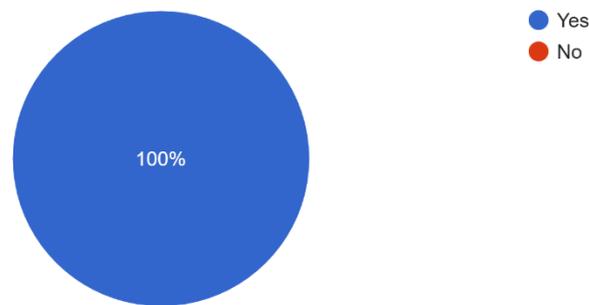
The data shows that nurses form the largest proportion of respondents (46.7%), followed by doctors (36.7%) and lab technicians (16.7%). This indicates that most participants are directly involved in patient care and waste generation activities. Nurses, being primarily responsible for waste segregation at the point of generation, play a crucial role in effective biomedical waste management. Doctors contribute through supervision and policy implementation, while lab technicians handle hazardous laboratory waste requiring careful disposal. The findings highlight the importance of strengthening knowledge and training among clinical staff to ensure proper biomedical waste management practices in healthcare centers.



**Figure 2: Designation of Respondent**

### 3. Awareness of Biomedical Waste Management Rules

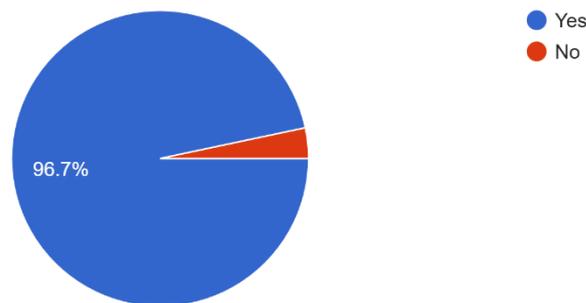
The findings reveal that all respondents are aware of the Biomedical Waste Management Rules, demonstrating a strong level of knowledge about the guidelines related to the segregation, handling, and disposal of biomedical waste. This suggests that healthcare personnel are well informed about the legal and safety requirements associated with waste management. Such universal awareness reflects effective communication and dissemination of information within healthcare centers. However, awareness alone does not ensure proper practice. Continuous training, supervision, and monitoring are necessary to translate this knowledge into consistent and effective biomedical waste management practices.



**Figure 3: Awareness of Biomedical Waste Management Rules**

#### 4. Received Training on Biomedical Waste Management

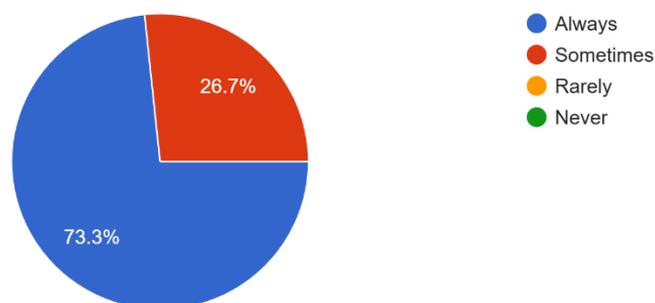
A large majority of respondents (96.7%) reported receiving training in biomedical waste management, while only 3.3% had not received any training. This reflects strong institutional efforts and high awareness among healthcare personnel in Wardha District regarding proper waste segregation, handling, and disposal. However, the small proportion of untrained staff highlights the need for continuous and comprehensive training to ensure complete compliance and minimize health and environmental risks.



**Figure 4: Received Training on Biomedical Waste Management**

#### 5. Waste Segregated at the point of generation

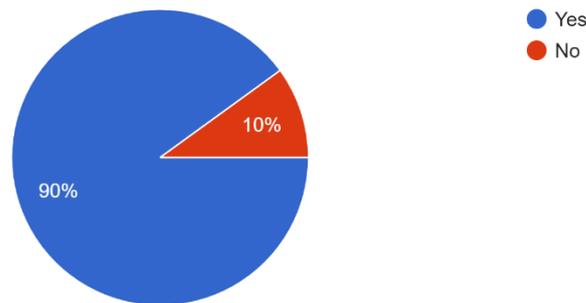
Most respondents (73.3%) reported that biomedical waste is always segregated at the point of generation, while 26.7% stated it is sometimes segregated, with none selecting rarely or never. This indicates generally good compliance with segregation practices in Wardha District, which is essential for infection control and safe disposal. However, the presence of occasional segregation highlights inconsistencies, emphasizing the need for stricter monitoring, reinforced protocols, and regular training to ensure consistent implementation across all healthcare centers.



**Figure 5: Waste Segregated at the point of generation**

### 6. Are color coded bins used

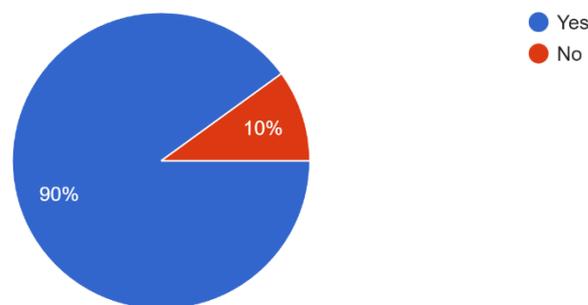
Most respondents (90%) reported using color-coded bins for biomedical waste segregation, while 10% indicated they do not. This shows that the majority of healthcare centers in Wardha District follow recommended guidelines for proper waste segregation. However, the absence of color-coded bins in some facilities points to gaps in implementation, highlighting the need for stricter supervision, adequate resources, and continued reinforcement of biomedical waste management practices.



**Figure 6: Are color coded bins are used**

### 7. Are Biohazard symbols displayed at Waste Container

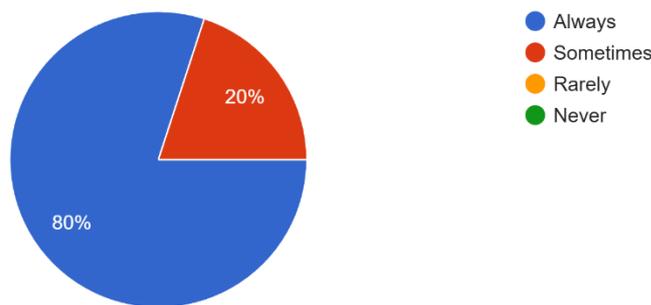
Out of 30 respondents, 90% stated that biohazard symbols are clearly displayed on biomedical waste containers, while 10% reported that they are not. This indicates that most healthcare centers in Wardha District are largely complying with Biomedical Waste Management guidelines, ensuring proper identification and safe handling of hazardous waste. Clear labelling helps prevent accidental exposure, promotes correct segregation, and enhances overall safety for healthcare workers and waste handlers. However, the 10% non-compliance highlights the need for improved monitoring, regular training, and stricter implementation of rules to achieve complete adherence to biomedical waste management standards.



**Figure 7: Are Biohazard symbols displayed at Waste Container**

## 8. Protective Equipment used while handling Waste

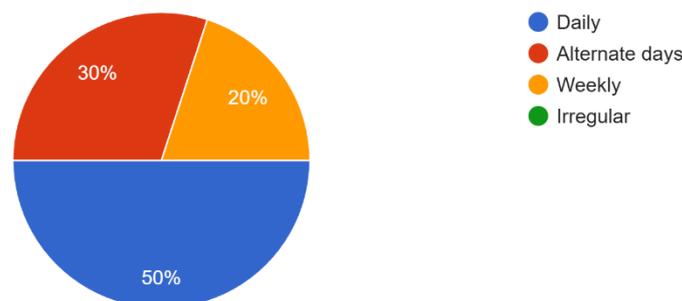
The findings indicate that 80% of respondents always use personal protective equipment (PPE) such as gloves and masks while handling biomedical waste, while 20% use it sometimes, and none reported rarely or never. This shows a generally good level of compliance with safety protocols in healthcare centers of Wardha District. However, occasional usage suggests the need for stricter supervision, regular training, and stronger enforcement of biomedical waste management guidelines to ensure consistent adherence to safety practices.



**Figure 8: Protective Equipment used while handling Waste**

## 9. Collection and Transportation of waste

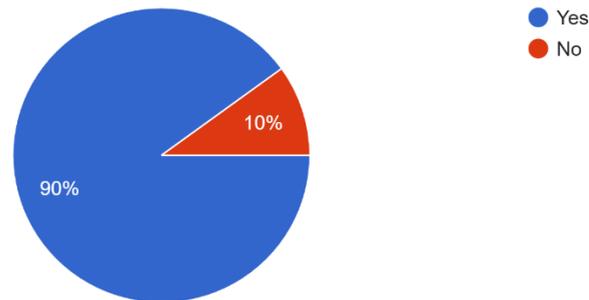
Half of the respondents reported daily biomedical waste collection, while 30% reported alternate-day and 20% weekly collection, with no irregular schedules. Although most facilities follow regular practices, increasing collection frequency especially in high patient load facilities would further improve safety and waste management.



**Figure 9 : Collection and Transportation of waste**

## 10. Record maintained for generation and disposal

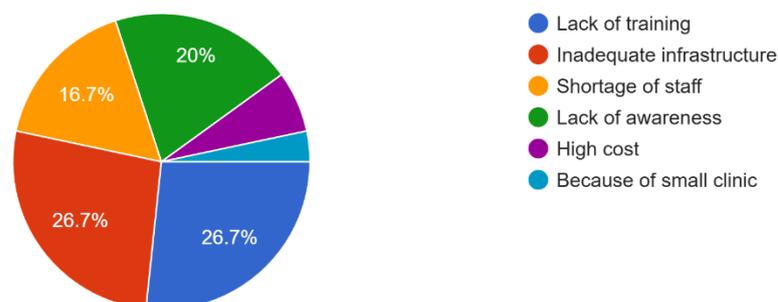
The findings show that 90% of respondents maintain records of biomedical waste generation and disposal, while 10% do not. This indicates strong compliance with documentation requirements in most healthcare centers of Wardha District. However, the small level of non-compliance highlights the need for stricter supervision and improved record-keeping to ensure complete transparency and effective waste management.



**Figure 10: Record maintained for generation and disposal**

## 11. Major problem faced in BMW management

The findings reveal that the major challenges in biomedical waste management include lack of training and inadequate infrastructure (26.7% each), followed by lack of awareness (20%) and staff shortage (16.7%), along with minor issues such as high costs and small clinic constraints, indicating that both knowledge gaps and resource limitations affect effective waste management in Wardha District. At the same time, all respondents either strongly agreed (50%) or agreed (50%) that proper biomedical waste management reduces health and environmental risks, reflecting strong awareness and a positive attitude among healthcare professionals, and emphasizing the need to strengthen training, infrastructure, manpower, and consistent implementation of waste management practices.



**Figure 11: Major problem faced in BMW management**

## 12. Proper BMW management reduce health risk.

The findings show that all respondents either strongly agree (50%) or agree (50%) that proper biomedical waste management reduces health and environmental risks, reflecting a unanimous positive perception and strong awareness among healthcare professionals. This highlights the importance of continued implementation and strengthening of effective waste management practices in Wardha District healthcare centres.

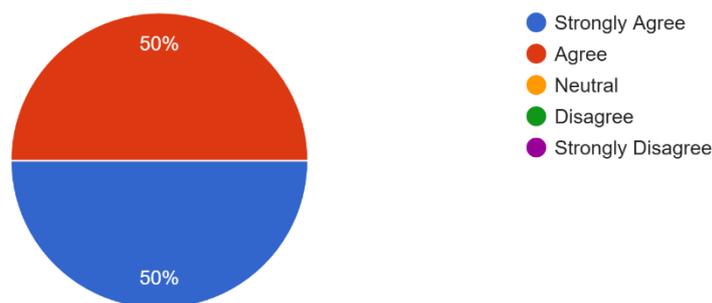


Figure 12: Proper BMW management reduce health risk.

## 13. Suggestions for improvement.

The findings show that 46.7% of respondents believe that all suggested measures combined are necessary to improve biomedical waste management, while others recommended regular training (26.7%), strict monitoring (26.7%), awareness programs (20%), and better infrastructure (13.3%). This indicates that a comprehensive and coordinated approach involving training, supervision, infrastructure development, and awareness is essential to strengthen biomedical waste management practices in Wardha District healthcare centres.

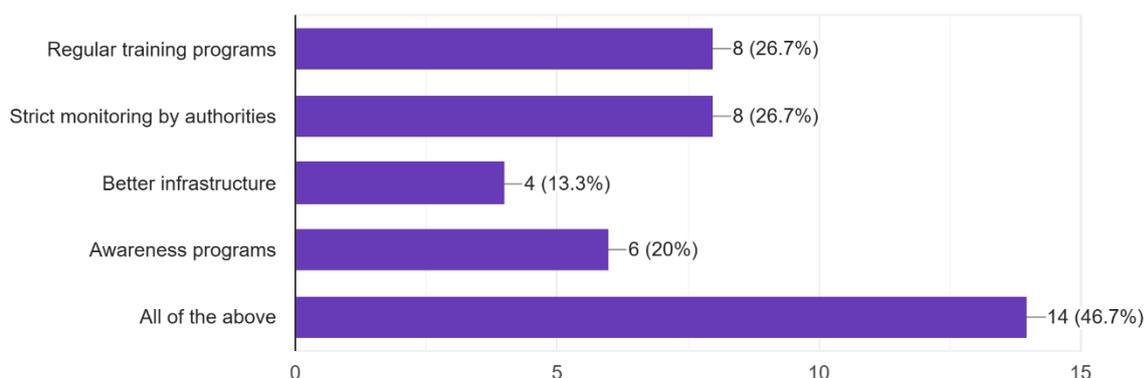


Figure 13: Suggestions for improvement

## HYPOTHESIS TESTING

### 1. Personal Protective Equipment and Health risk.

**H<sub>0</sub>:** There is no impact of use of PPE on health risk.

**H<sub>1</sub>:** There is impact of use of PPE on health risk.

Regression Statistics	Column1
Multiple R	0.166666667
R Square	0.027777778
Adjusted R Square	-0.006944444
Standard Error	0.510310363
Observations	30

### ANOVA

Column1	df	SS	MS	F	Significance F
Regression	1	0.208333333	0.208333333	0.8	0.378717723
Residual	28	7.291666667	0.260416667		
Total	29	7.5			

Column1	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	1.25	0.2946278	4.24264	2.19E-04	0.646482	1.8535177	0.646482	1.853518
X Variable 1	0.20833	0.2329237	0.89443	0.37872	-0.26879	0.685456	-0.268789	0.685456

The "p" value is 37.87% which is greater than the 5% level of significance. Hence, it is concluded that there is no impact of use of PPE on health risk. Hence, the null hypothesis i.e., there is no impact of use of PPE and health risk is accepted and the alternative hypothesis, there is impact of use of PPE on health risk is rejected.

**CHAPTER V: FINDINGS,  
CONCLUSION & SUGGESTIONS**

## **FINDINGS**

1. Most healthcare centers properly display biohazard symbols on waste containers, indicating good adherence to biomedical waste management guidelines.
2. The majority of institutions maintain records of biomedical waste generation and disposal, reflecting accountability and regulatory compliance.
3. Most healthcare workers consistently use PPE such as gloves and masks while handling biomedical waste, ensuring occupational safety. However, occasional inconsistency still exists in some facilities.
4. Waste is generally collected and transported on a regular basis, with many facilities ensuring daily disposal. This helps prevent waste accumulation and reduces health risks.
5. Respondents strongly agree that proper biomedical waste management reduces health and environmental hazards, showing high awareness among healthcare professionals.
6. Key problems include lack of training, inadequate infrastructure, shortage of staff, lack of awareness in some cases, and financial constraints, especially in smaller healthcare centers.
7. Many respondents suggested that a combination of training, strict monitoring, awareness programs, and infrastructure development is necessary for effective improvement.

## CONCLUSION

The study on biomedical waste management practices in healthcare centers of Wardha District reveals that overall awareness and basic compliance with Biomedical Waste Management Rules are satisfactory. Most healthcare personnel, particularly nurses and doctors who are directly involved in patient care and waste handling, demonstrate adequate knowledge and have received formal training in biomedical waste management. Essential practices such as segregation at the point of generation, use of color-coded bins, display of biohazard symbols, maintenance of records, and use of personal protective equipment are largely followed. Regular collection and transportation systems are also in place in most facilities.

However, despite high awareness and training levels, certain gaps remain in consistent implementation. Issues such as occasional non-segregation of waste, irregular use of protective equipment, absence of proper labeling in some facilities, and minor lapses in record maintenance indicate the need for stronger monitoring and enforcement. Additionally, challenges such as lack of infrastructure, insufficient training, staff shortages, and financial constraints affect effective biomedical waste management.

Overall, the findings conclude that while biomedical waste management practices in Wardha District are generally satisfactory and guided by positive attitudes among healthcare professionals, continuous training, improved infrastructure, strict supervision, and a comprehensive approach are essential to achieve full compliance and ensure protection of public health and the environment.

## **SUGGESTIONS**

1. Conduct periodic training sessions and workshops for doctors, nurses, laboratory staff, and waste handlers to enhance technical knowledge and practical skills.
2. Regulatory authorities should conduct regular inspections and audits to ensure strict compliance with Biomedical Waste Management Rules.
3. Improve facilities for waste segregation, storage, transportation, and disposal, including proper color-coded bins and treatment equipment.
4. Organize awareness campaigns within healthcare centers to reinforce safe practices and environmental responsibility.
5. Make PPE usage mandatory and ensure uninterrupted supply to protect healthcare workers from occupational hazards.
6. Provide government assistance and subsidies, especially to small clinics and rural healthcare centers, to improve waste management systems.
7. Introduce computerized systems for maintaining biomedical waste records to improve transparency and efficiency.

## **FUTURE SCOPE OF THE STUDY**

Future research can broaden the scope of this study by extending it beyond Wardha District to include multiple districts, regions, or even state-level comparisons, which would allow for a more comprehensive understanding of biomedical waste management practices across different geographical settings. Such comparative analysis could help identify regional disparities, best practices, and context-specific challenges. Additionally, future studies can employ advanced statistical tools such as regression analysis, correlation models, and structural equation modeling to examine the relationship between key variables like staff training, infrastructure availability, awareness levels, and compliance with biomedical waste management rules. This would provide deeper insights into the factors that significantly influence effective implementation. Researchers may also evaluate the impact and effectiveness of government policies, regulatory monitoring, and financial support schemes in improving compliance levels. Furthermore, exploring sustainable and eco-friendly biomedical waste treatment technologies, such as advanced sterilization methods and environmentally safe disposal systems, can contribute to long-term environmental protection. Longitudinal studies conducted over several years would help assess progress, measure the impact of interventions, and track improvements in waste management practices over time, thereby providing valuable evidence for policy formulation and continuous improvement.

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# APPENDICES

## APPENDICES

### Google Form / Questionnaire.

# A Study on Biomedical Waste Management Practices in Healthcare Facilities of Wardha District( वर्धा जिल्ह्यातील आरोग्य सेवा संस्थांमधील जैववैद्यकीय कचरा व्यवस्थापन पद्धतीचा अभ्यास )

Thank you for your kind cooperation and for sharing your valuable time and insights. Your contribution is highly appreciated

\* Indicates required question

1. Email \*

\_\_\_\_\_

2. 1.Name of the Healthcare Facility( आरोग्य सेवा संस्थेचे नाव ) \*

\_\_\_\_\_

3. 2.Type of Healthcare Facility ( आरोग्य सेवा संस्थेचा प्रकार ) \*

*Mark only one oval.*

Government Hospital

Private Hospital

Nursing Home

Clinic

Diagnostic Laboratory

4. 3.Designation of Respondent ( प्रतिसाद देणाऱ्याचे पद ) \*

*Mark only one oval.*

Doctor

Nurse

Lab Technician

Waste Handler

Other:

\_\_\_\_\_

5. 4.Are you aware of the Biomedical Waste Management Rules? ( आपल्याला जैववैद्यकीय \*  
कचरा व्यवस्थापन नियमांची माहिती आहे का?)

*Mark only one oval.*

Yes

No

6. 5.Have you received any training on biomedical waste management? ( आपल्याला \*  
जैववैद्यकीय कचरा व्यवस्थापनाबाबत प्रशिक्षण देण्यात आले आहे का?)

*Mark only one oval.*

Yes

No

7. 6.Is biomedical waste segregated at the point of generation? ( जैववैद्यकीय कचरा निर्माण \*  
होताच त्याचे वर्गीकरण केले जाते का?)

*Mark only one oval.*

Always

Sometimes

Rarely

Never

8. 7.Are color-coded bins used for waste segregation? ( कचरा वेगवेगळ्या प्रकारात \*  
ठेवण्यासाठी रंगकोडित डबे वापरले जातात का?)

*Mark only one oval.*

Yes

No

9. 8.Are biohazard symbols clearly displayed on waste containers? ( कचऱ्याच्या डब्यावर \*  
जैव-धोकादायक चिन्ह स्पष्टपणे दाखवलेले आहेत का )

*Mark only one oval.*

Yes

No

10. 9.Is personal protective equipment (gloves, masks, etc.) used while handling \*  
waste? ( कचरा हाताळताना हातमोजे, मास्क इत्यादी वैयक्तिक संरक्षण साधने वापरली जातात का?)

*Mark only one oval.*

Always

Sometimes

Rarely

Never

11. 10.Is waste collected and transported regularly from your facility? ( आपल्या संस्थेतून \*  
कचरा नियमितपणे गोळा करून वाहून नेला जातो का? )

Mark only one oval.

- Daily  
 Alternate days  
 Weekly  
 Irregular

12. 11.Are records maintained for biomedical waste generation and disposal? ( \*  
जैववैद्यकीय कचरा निर्माण व निपटारा यासाठी नोंदी ठेवल्या जातात का? )

Mark only one oval.

- Yes  
 No

13. 12.What are the major problems faced in biomedical waste management? ( \*  
जैववैद्यकीय कचरा व्यवस्थापनात मुख्य समस्या कोणत्या येतात? )

Mark only one oval.

- Lack of training  
 Inadequate infrastructure  
 Shortage of staff  
 Lack of awareness  
 High cost  
 Other:

14. 13.Do you think proper biomedical waste management reduces health and \*  
environmental risks? ( आपल्याला असे वाटते का की योग्य जैववैद्यकीय कचरा व्यवस्थापनामुळे  
आरोग्य आणि पर्यावरणीय धोके कमी होतात? )

Mark only one oval.

- Strongly Agree  
 Agree  
 Neutral  
 Disagree  
 Strongly Disagree

15. 14.What measures would you suggest to improve biomedical waste \*  
management? ( जैववैद्यकीय कचरा व्यवस्थापन सुधारण्यासाठी आपण कोणती उपाययोजना  
सुचवाल? )

Check all that apply.

- Regular training programs  
 Strict monitoring by authorities  
 Better infrastructure  
 Awareness programs  
 All of the above

**Geotag Photos**



