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# Awareness and Practice of Biomedical Waste Management

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***Abstract*- Healthcare is an important area of human care. The very process of modern healthcare is also ridden with risk and unhealthy practices. One of this is Bio Medical Waste generation in treatment of human beings; apart from other species. This Bio Medical Waste generation warrants proper Bio Medical Waste management. Bio Medical Waste is defined as waste that is generated during the diagnosis, treatment or immunization of human beings and is contaminated with patients body fluids such as syringes, needles, dressings, disposables, plastics and microbiological wastes. Proper disposal of hospital waste is of paramount importance because of its infectious and hazardous characteristics. Therefore the Government of India promulgated the Bio Medical Waste Rules in 1998 and it became mandatory for all the hospitals to follow the above rules and the standards laid down under the statutory regulations. Healthcare is vital and hospitals are considered to be healers and protectors of health and wellbeing. But the waste generated from treatment and diagnosis can be hazardous, toxic and even lethal because of their high potential for disease transmission. The present study consists of BMW management practices like Segregation, Treatment and Disposal, Waste Handling Safety Measures and Waste Administration that are followed in healthcare facilities. It focuses on the waste management practices of the respondent healthcare facilities on the basis of type of hospital, bed capacity, bed occupancy, amount of waste generation and number of waste handling workers. Besides, the study extends to see the impact of demographical factors on waste management practices. From the related questions regarding `segregation practices`, 'treatment and disposal practices, 'waste handling safety measures' and 'waste administration' scores were calculated. Further, based on quartiles, scores are categorized into 3 components viz., Low, Moderate, High for assessing the respondent HCFs view on the waste management practices in the HCFs. The data collected for this study was processed by using SPSS Version 19.0. Descriptive statistical tools like percentages, means and standard deviation and analytical tools like Chi-square, t-test, one way ANOVA, Correlation and Regression are used to test the significant association and impact between characteristics of HCFs and Waste Management Practices.**

***Keywords*- Environmental problems, Hazardous waste, Hospital waste management, Medical waste, waste generation.**

## I.INTRODUCTION

As the growth and development of human life goes on, the 20th century is the largest century, and the pace of change is accelerating.Intelligence and technology can bring about significant changes in material happiness, economic gro wth, education, health care, etc. At the same time, similar incidents can lead to material abuse, pollution, population explosions,environmental imbalances, conflicts and wars with complex technologies, diseases and suffering. Health care is an important area of human care.

The whole process of modern medicine is also full of ris ks and unhealthy practices.One of them is the produ ction of biomedical waste for human medicine; among other species.Such biomedical waste management requires pro per biomedical waste management.Biomedical waste is defined as waste produced during diagnosis, treatment or immunization of individuals and contaminated with fluid in the patient's body, such as syringes, needles, clothing, disposable, plastic and microbial waste. Proper disposal of hospital waste is contagious and dangerous, so it is very important. Therefore, the Indian government issued the "Biomedical Waste Regulation" in 1998, and all hospitals must comply with the standards set out in the above laws and regulations.

Treatment is of paramount importance and the hospital is considered a healer and protects health and wellness. However, because medical and diagnostic waste is likely to spread disease, it can be dangerous, poisonous or even deadly. Hazardous and toxic substances in medical waste include disposable waste, radioactive waste and sharp wastes, such as plates, knives, needles and tongues (Keene ,1991).

If these materials enter the natural environment without proper treatment/disposal or through municipal waste, they can be very dangerous. Encouraging the growth of various pathogens and parks, as a result, non-toxic and non-toxic

municipal waste becomestoxic,destructive and undermines efforts to manage waste in general. Medical and medical waste workers, in addition to the general public, are often hit unintentionally or unintentionally, because when they try to isolate recyclable items they will ignite various toxic substances (Neveu and Matus, 2007)).

However, such illegal and unethical dedication can be very dangerous, and sometimes even deadly, biological and non-biological. Because medical personnel and the public do not dispose of health waste as intended, there will be opportunistic infections such as HIV, hepatitis B, tuberc ulosis and cholera (Yoshikawa etal.,2013 and 2007; Fitzsimons etal. 2008).

With wise planning and management, the risks posed by professional staff and the public can be greatly reduced. Previous research reports clearly show that three-quarters of hospital waste is non-hazardous and non-toxic, and the rest is contagious and destructive. Therefore, a hazardous waste disposal system is needed to reduce health risks. Similarly, better planning and management will reduce the cost of waste management in general.

Nowadays, institutional establishment, training and motiva tion have become very important.However, proper training of staff at all levels of medical institutions, along with ongoing awareness, can improve waste management. The law enacted by the Ministry of Environment and Forests (MOEF) of the Government of India, known as the "BiomedicalWaste(Managementand Disposal) Regulations 1998", was issued on July 20, 1998, providing coherent and detailed instructions. country. This rule clearly states that the occupiers of institutions (such as hospitals, nursing homes, hospitals, pharmacies, family institutions, farms, pathology laboratories, blood banks, etc.)It creates biomedical waste It should be responsible for taking the necessary steps to ensure that such waste does not adversely affect human health and the environment.

## II. CATEGORIES OF BIO MEDICAL WASTE

In November 1988, the U.S. Congress passed the Health Surveillance Act, requiring the EPA (Environmental Prote ction Agency) to set up a demonstration program to track health waste and provide information to Congress. health waste monitoring laws. It was later classified by the EPA as a health waste disposal program. The EPA lists seven types of health waste, which are designated as controlled health waste.Recently,theEPA reviewed the list of specific health waste to determine if the list accurately identified the types or classifications of waste that could pose a risk to human or environmental health. As a result of the assessment, the EPA also examined two new types of waste based on potential hazards. These types of waste are cytotoxic waste and low radio active waste (Fed Regist, 1981).

**1. Cytotoxic Wastes:**
According to safety and rehabilitation laws, seven cytotoxic drugs are classified as dangerous because of their toxicity and their ability to produce mutagenic and teratogenic effects when discarded or discarded. These include mephaline, streptozotocin, uracil, mustard, daun omycin,chlorambucil,mitomycinC and cyclophosphamide. Cytotoxic drugs are considered dangerous when discarded or discarded. However, many cytotoxic drugs have been approved by the Food and Drug Administration with similar systems and structures that are classified as hazardous waste (Sharma et al., 2013).

**2. Low Level Radioactive Wastes:**
To visualize and monitor the functioning of organs, animals, and humans, as well as diseases or disorders that require the destruction of cells, cells or organs or diseased organs, low-level radioactive waste is available treatment is called It is low radioactive waste. For example, X-rays, CT scans and MRI scans will emit radioactivity after use and the device should be carefully discarded to avoid radiation exposure to the biological environment. Disposal should be monitored by well-trained workers who have received training in nuclear science (Saad, 2013).

**3. Regulated Medical Waste:**
Controlled health waste refers to specific types of clean waste, including specific types of medical waste that need to be inspected and monitored. According to EPA law, medical waste refers to any waste that is produced by the identification, treatment or immunization of humans, animals, related research, or the preparation for burial or cremation., as defined by this law. The production or testing of biological products, or the development of drugs. After mixing medical waste mixed with non-hazardous waste, it must be considered as contro lled medical waste.The following are the categories of controlled health waste:

**4. Categories of Healthcare Waste as per the Ministry of Environment & Forests, India:**
The Environment (Protection) Act of 1986 (No. 29 of 1986) was published in Gazette SO Resolution No.746(E) dated October 16,1997,since the above notice was issued in 1998 "Biomedical waste (management andthe public are invited to raise objections within 60 days after the issuance of the Regulation" Disposal), and any objections received in a timely manner should be reviewed in a timely manner.

Therefore,the central government exercised the powers conferred by Articles 6,8 and 25 of the Enviro nmental(Protection) Act of 1986, and notified of the Bio medical Waste Manage ment Act and the Disposal Rules. According to Schedule1, Rules:5, the following categories of biomedical waste are:The ten major categories of BMW produced in the field of human care should be carefully considered through specialized technical.

## III. CHARACTERISTICS OF HOSPITAL WASTE

The physical appearance, structure, behavior, persistence, pathogen levels, rate of migration and feeding of the waste in Indian-born hospitals vary greatly. All of these factors and local conditions (suchas temperature,humidity, ground water level and soil structure) determine the amount of damage caused by various hospital waste. Toxic and long-lasting waste with high biomagnifications doses is consid ered a high-risk waste.Metal hydroxide sludge is consi dered moderate waste,while hazardous waste is considered low risk waste. In the presence of a dispersing substance, hospital waste is divided into transferable and non-transferable waste.Any hospital waste that can harm bacteria and parasites can be called "contagious waste". Pathological wastes such as organs, limbs, body fluids, and organ fragments can be classified as contagious wastes.

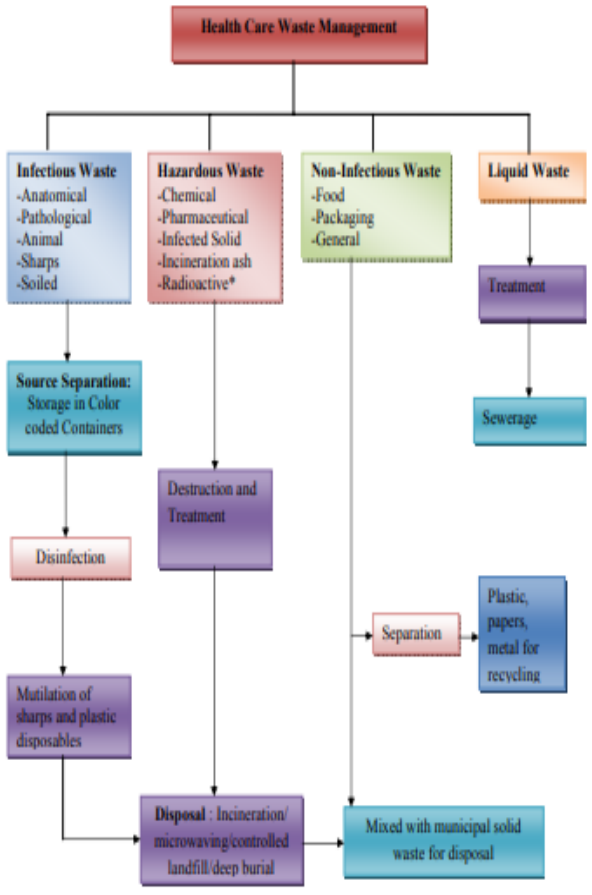


Fig 1. Management of Health Care Waste in India Health Care Waste Management.

Waste from kitchen clothing, food stored in the hospital canteen and food taken by visitors are considered general waste and are similar to municipal waste. These general wastes are non-toxic. Hospital waste usually contains 80-90% non-toxic substances (Orias and Perrodin, 2013). The general waste includes paper containers, disposable coffee and tea cups, wrapping paper, and leftover food items, such as bread crumbs.Chemicals containing toxic chem icals,drugs and drugs are considered hazardous waste as they can be harmful to public health. Outdated drugs are the best example of hazardous waste (Saussereau et al., 2013). The production of various drugs in the form of drugs has made a significant contribution to the global collection of antidepressants.

Solid waste, liquids and gases of radio nuclides are classified as radioactive waste.Glass and other radiological centers have emerged as mushrooms after rain, and have played an important role in the production of radioactive waste (Ravichandran et al., 2011). Apparently, waste is also divided into sharp and non-sharp wastes. It often transfers sharp wastes, such as needles and debris. However, in its “Gazette of India” published in 1998, the Ministry of Environment and Forests first tried to identify and classify the biomedical wastes produced by all medical institutions.These include human anatomical wastes, animal wastes, microbial and biological wastes, acute wastes, wastes and cytotoxic wastes, wastes, wastes, water wastes, incinerators and chemical wastes. Figure I.2 illustrates the different types of waste and is discussed. Demonstrate a healthy waste management process.

## IV. RESEARCH METHODOLOGY

The study has adopted the following procedure to carry out the study.

**1. Need and Significance of the study:**

In India, some researchers (hence the government and the Ministry of the Environment, the government) have agreed on a way to dispose of illegal biomedical waste. Under the supervision of the Pollution Control Committee, the Indian government has developed rules and regulations for the establishment and management of biomedical waste. In practice, there are many difficulties in fulfilling these requirements in many places. To assess and evaluate waste collection conditions across India and the Chidor region of Andhra Pradesh, this study examines waste disposal methods and waste practices. Biomedical waste is harmful to organisms; therefore, appropriate waste management methods are urgently needed.

In this case, a comprehensive study was conducted on waste production and waste disposal in India and Andhra Pradesh, as well as waste disposal practices in Chidor District in Andhra Pradesh. This study helps government officials take appropriate rehabilitation measures to protect the health of workers and the general public.Similarly, the analysis of secondary data provides an annual biomedical waste rate. This helps to build a biomedical waste disposal facility in a conve nient location, reducing the mixing of BMW waste and waste. The research helps to examine the isolation methods, treatment methods, waste disposal and

safety measures taken by various hospitals in Chittoor district. In this regard, this research can stimulate hospital waste management requirements for sanitation and govern ment, and give them ideas to consider how to manage and dispose of them properly, and to consider how to dispose of them -work.

## V. OBJECTIVE

The main objectives of the research can be defined as:

- Knowledge of what is happening and the development of biomedical waste in India from a macro perspective
- Explain the popular management and management of biomedical waste in Andhra Pradesh
- Carefully consider the nature and amount of biome dical waste
- Evaluate biomedical waste technology and manage ment practices related to the area
- Highlight the challenges faced by biomedical waste management in the region
- Provides policy proposals for the happiness of institu tions, the environment and society to promote better biomedical waste management.

The research method can be divided into four steps. The first step is to look at HCF from a national perspective, the number of beds in the country, the area of the area and the waste generated. In the second phase, Andhra Pradesh is the focus, with the strengthening of HCF, bedding and waste production in the state and the region. The third and fourth stages are the Chitoor district of Andhra Pradesh. Investigated the installation and operation of the CBM WTF in this area. HCFs in school areas were surveyed to identify the different management practices in HCF and to evaluate better management.

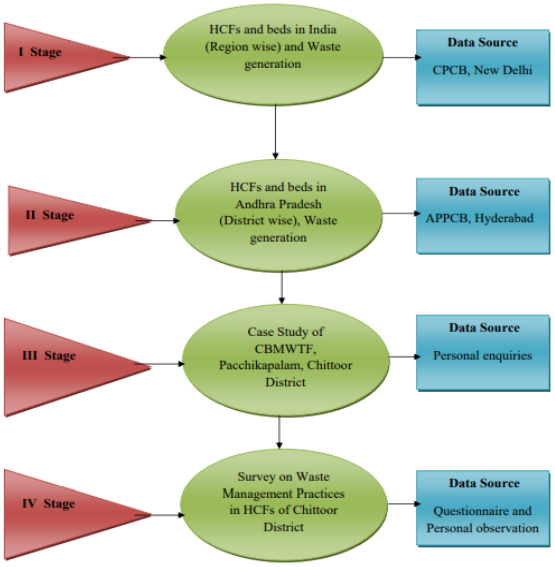


Fig 2. Schematic representation of work plan.

## VI. HYPOTHESIS

HCF studies in the region revealed various hypothotical statements. For the type of hospital, the type of hospital, number of beds, number of beds, the amount of waste, the amount of waste produced, and the human resources for waste disposal, 11 considerations of waste management practices. These 11 considerations can also be divided into four types of waste organization methods, namely isola tion practices,waste treatment and disposal, waste disposal safety procedures and waste management.

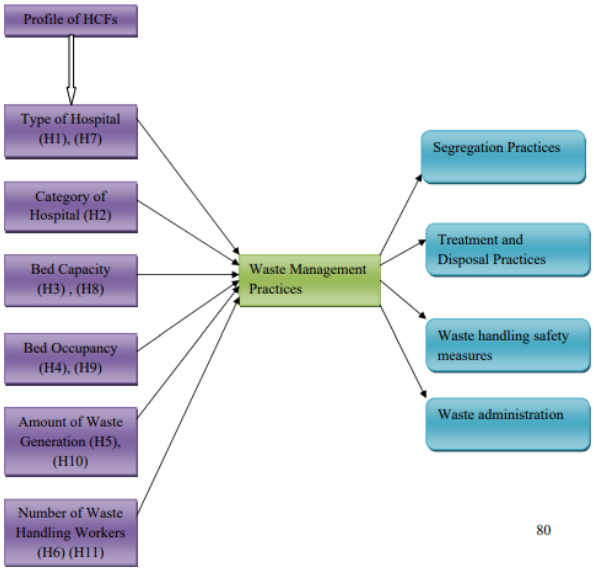


Fig 3. Formulated Research Hypothesis.

Hypothesis1**:** There is no important relationship among hospital type or waste Management methods.
Hypothesis2: hospital category and Waste management methods.
Hypothesis3:There is no significant relationship between bed capacity and waste Management methods.
Hypothesis4:There is no significant relationship between bedding or trash Management methods.
Hypothesis5:There is no important relationship between the amount of waste produced And how to manage waste.
Hypothesis6:There is no significant relationship between the amount of waste generated Employees and waste manage ment methods.
Hypothesis7: This type of hospital does not have a impo rtant bang on waste management application.
Hypothesis8: Bed capacity does not have a major bang on waste management application .
Hypothesis9: Bedding does not have a significant impact on waste management methods.
Hypothesis10: The amount of waste produced will not have a significant impact on waste management methods

Hypothesis11: The number of waste management workers has a significant impact on waste management practices.

## VII. DATA SOURCES AND COLLECTION

Support data were collected from the Central Pollution Control Bureau (CPCB) in New Delhi, India to monitor waste production rates in India. The number of hospitals, beds and BMW built per hospital per bed has been collected between different states in India. The data were analyzed to determine the amount of waste, the amount of waste dumped in the environment, and the waste mixed with municipal waste. Similarly, comprehensive data were obtained in Andhra Pradesh to look at waste production rates and treatment options. The documents were obtained from the U.S. Pollution Control Commission. Data on the number of hospitals and the waste produced by each hospital are kept by the National Pollution Control Commi ssion.

These data will be verified, verified and documented by the state pollution control commission. All states regularly send data to the CPCB in New Delhi. Data collection on 3-year waste production was collected in Indian hospitals (i.e. 2009-2010 to 2011-2012). The complete data on A.P. biomedical waste treatment equipment (CBMWTF) compi led and stored in accordance with the principles of the Ministry of Environment and Forests is collected from Hyderabad A.P. Pollution Control Board (APPCB). It also collects the number of hospitals, waste produced by public hospitals and (private) hospitals listed in the CBMWTF. Data were verified from private hospitals registered under the Regional Medical and Health Office (DM&HO) at each regional center. There was a comparison to see the waste generated across the state and the waste proposed by the CBMWTF across the state. The whole study depends on primary and secondary data.In order to draw concl usions about the waste production rate in India, the auxi liary data plays an important role. The large data collected on demand helps to understand the management of HCF biomedical waste in the Chittoor district. Both primary and secondary data collection are unexpected tasks. Responses to the board of directors are awaited .Provide relief documents.

However, it has become a difficult task to complete this task by the person concerned. Assuming that each hospital is the subject of the investigation, it is also expected that a large amount of data will be collected. Therefore, the inqu iry was conducted to obtain information from the hospital staff. However, officials at each hospital did not provide the expected information, believing that the information could be disclosed or used for other purposes. As a result, other methods were used to obtain data from relatedHCFs. In order to determine the correct classification, treatment, disposal and safe disposal of biomedical waste, a research methodology has been used to investigate hospitals in the Bochidor district of Andhra Pradesh. For this purpose, the question is designed according to the standards set by the World Health Organization (WHO). The pilot study was conducted by distributing questionnaires to HCF 10 in Tirupati. As for their difficulty in commenting, the words in the questionnaire were updated as they understood and answered the questions.

Table 1. Growth of Bed Strength by State in East India. (Percent change over 2014-15 to 2015-16 and 2015- 16to 2016-17)

| S. N. | State/UT | Total Number of Beds | | | | |
|---|---|---|---|---|---|---|
| | | 2009-10 | 2010-11 | Percentage Increase/ Decrease | 2011-12 | Percentage Increase/ Decrease |
| 1 | Arunachal Pradesh | 650 | 1,140 | +75.38 | 1,040 | -8.77 |
| 2 | Assam | 19,331 | 19,751 | +2.17 | 19,751 | 0 |
| 3 | Bihar | 22,871 | 24,744 | +8.18 | DNA* | |
| 4 | Jharkhand | 19,586 | 20,797 | +6.18 | 18,587 | -10.62 |
| 5 | Manipur | 3,925 | 2,383 | -39.28 | 2,652 | +11.28 |
| 6 | Meghalaya | 5,788 | 5,475 | -5.40 | 5,719 | +4.45 |
| 7 | West Bengal | 92,950 | 92,315 | -6.83 | 94,649 | +2.52 |
| 8 | Orissa | 27,000 | 28,326 | +4.91 | 30,154 | +6.45 |
| 9 | Sikkim | -- | -- | -- | -- | -- |
| 10 | Mizoram | 1,607 | 2,654 | +65.15 | 2,675 | +0.79 |
| 11 | Nagaland | 2,133 | 2,334 | +9.42 | 2,318 | +0.68 |
| 12 | Tripura | 3,576 | 3,576 | 0 | 3,792 | +6.04 |
| 13 | Total | 1,99,417 | 2,03,495 | +2.04 | 1,81,337 | -10.88 |

**The question is divided into two sections:**

- The first part contains the HCF configuration file in the Chittoor area (type, location, category, bed, etc.)

- The second part covers the issues related to hospital waste management methods (dedication, treatment, safety measures and management aspects).

**1. Residents:** The research was conducted in Chittoor District, Andhra Pradesh. The number of surveys is 271 basic health bases, of which 20 are government agencies and 251 are private medical institutions.

**2. Sample Technique:** The technique used is one of the simplification samples, but it is based on a principle. The HC1 271 distribution in the region is divided into four clusters. The goal is to analyze 50% of the HCF in each cluster to obtain results. There is a purposeful deviation, and that is to include most of the government's health basics in the investigation. Public hospitals account for only 6.5% of the total, but beds are higher.

**3. Sample Size:** Out of 271 HCFs,134 HCFs were selected for the investigation.

Table 2. Average Bed Strength in Different States in East India.
(Percent change over 2014 to 2015 and 2016 to 2017).

| SL. No. | State/UT | Average Bed Strength (%) | | |
|---|---|---|---|---|
| | | 2009-10 | 2010-11 | 2011-12 |
| 1 | Arunachal Pradesh | 15.5 | 24.8 | 22.6 |
| 2 | Assam | 19.25 | 19.7 | 19.6 |
| 3 | Bihar | 11.63 | 12.0 | -- |
| 4 | Jharkhand | 22.4 | 22.14 | 22.0 |
| 5 | Manipur | 6.01 | 3.7 | 4.1 |
| 6 | Meghalaya | 9.77 | 8.27 | 8.2 |
| 7 | West Bengal | 19.56 | 16.53 | 16.1 |
| 8 | Orissa | 21.8 | 21.6 | 22.0 |
| 9 | Sikkim | -- | -- | -- |
| 10 | Mizoram | 17.0 | 29.1 | 30.0 |
| 11 | Nagaland | 35.6 | 21.4 | 23.5 |
| 12 | Tripura | 3.38 | 3.3 | 3.4 |

When considering the strength of the average bed, East India has a mixed trend. During the period of observation, the strength of the average beds in Assam, Jharkhand, Odisha and Tripura was almost stable.In Arunachal Pradesh,the average flood rate increased in 2010-11, while the average flood rate in 2011-12 decreased. In Manipur or Nagaland, bed strength increased in 2011-12 after it began todecline in 2010-11.At Mizoram,the average bed strength increased each year during study period. In West Bengal and Meghalaya,river rates in 2010-11 decreased compared to last year, and remained stable in 2011-12 (Table-III. EI.3). All these facts and figures confirm government's promise to provide 100% access to public.

When one aspect of the image is considered, referring to the measures taken to protect the environment and public health from the burden of biomedical waste,various stan dards have resulted in a disturbing image. According to BMW (Management and Processing Regulations) in 1998, considering the use of CBMWTF to register for HCF, the number of enrollments increased during the study period. In 2010-11, the number of registered people increased by 26.99% compared to last year.

Table 3. Growth of HCFs Registration with CBMWTF in East India.
(Percent change over 2014 to 2015 and 2016 to 2017).

| SL. No. | State/UT | Number of HCFs Registered with CBMWTF | | | | |
|---|---|---|---|---|---|---|
| | | 2009-10 | 2010-11 | Percentage Increase/ Decrease | 2011-12 | Percentage Increase/ Decrease |
| 1 | Arunachal Pradesh | 0 | 0 | 0 | 0 | 0 |
| 2 | Assam | 75 | 140 | +86.6 | 140 | 0 |
| 3 | Bihar | 135 | 214 | +58.51 | DNA* | |
| 4 | Jharkhand | 294 | 300 | +2.04 | 300 | 0 |
| 5 | Manipur | 0 | 0 | 0 | 0 | 0 |
| 6 | Meghalaya | 22 | 22 | 0 | 27 | +18.51 |
| 7 | West Bengal | 4,116 | 5,196 | +26.23 | 5,883 | +13.22 |
| 8 | Orissa | 303 | 408 | +34.65 | 429 | +5.14 |
| 9 | Sikkim | -- | -- | -- | -- | -- |
| 10 | Mizoram | 0 | 0 | 0 | 0 | 0 |
| 11 | Nagaland | 0 | 0 | 0 | 0 | 0 |
| 12 | Tripura | 0 | 0 | 0 | 169 | -- |
| | Total | 4,945 | 6,280 | +26.99 | 6,948 | +10.63 |

As another option for CBMWTF donations, HCFs are encouraged to design BMW indoor clinics if possible. Given the number of HCFs with BMW in-house manufac turing facilities, the East India region continued to experie nce positive growth during the study period. In eastern

India, the number of HCFs with BMW clinics inside increased by 18.98% in 2010-11 compared to last year, and then increased by 28.61% in of 2011-12. It was a great success. In Jharkhand, West Bengal and Nagaland, the number of HCF home-based clinics decreased in 2011-12 compared to 2010-11.

**4. Treatment and Disposal Practices:** To observe the treatment and disposal of techniques used in the HCF test, the following questions were constructed: "Use internal combustion plants, autoclaves, shredders, needle burners, chemical disinfectants, landfills and discharges in public drainage to assess the level" and send BMW to CBMWTF. Practice (Sharma & Chauhan, 2008). The purpose of the research is to correlate treatment and treatment methods with the properties of health facilities (HCF) (Singh et al., 2004). In waste management practices, the treatment and disposal practices used are very important. According to the rules in Table 5 and depending on the type of waste, the method of disposal will vary with the use of scientific standards for the operation of technical instruments such as incinerators,autoclavesand microwave ovens.

However, most respondents (100.0%) did not have inciner ators, autoclaves, shredders, and pyrolysis devices in all HCFs in the Chittoor area, but most HCFs often use needle burners.94%of respondents have signed up for BMW out sourcing treatment services in CBMWTF. Many HCFs do not have landfills because they use outsourced facilities, while 88.1% of HCFs release their microbial waste into public sewers and drains. This has caused great damage to the ecosystem and as a result more The antibiotic-resistant superbacteria are daily (Chitnis et al., 2003).

## VIII. CONCLSUION

The main purpose of this study is to evaluate (i) BMW production rate (ii) HCF and number of beds in HCF (iii) CBMWTF and management practices in India and Andhra Pradesh. The results of secondary data in India and Andhra Pradesh are linked to the key data collected in the questionnaire to verify the accuracy of BMW's production and management practices in the Chidor district of Andhra Pradesh.

This study is useful for HCF and the competent authorities of the Indian Pollution Control Council to take appropriate remedial action for the proper management of BMW in India. BMW management is not only a technical issue, but is also strongly influenced by the healthcare industry and the country's economic conditions.

As a result, enacting laws is not enough, and only resear chers from the healthcare industry can formulate or implement sustainable solutions.

**1. Suggestions to the Hospitals:**

- All HCFs must follow the norms prescribed by Pollution Control Board strictly.
- Usage of colour coded and puncture proof bins must be a mandated for all HCFs to prevent mixing of infectious and non-infectious waste.
- All hospitals have to monitor waste generation and disposal practices regularly.
- There should be a separate wing to monitor the needle stick/ sharp injuries to minimize the spread of infectious diseases
- All the HCFs should take appropriate measures to avoid illegal/illegitimate segregation of BMW by rag pickers.
- Waste handling workers should be provided with protective masks and gloves to protect from infectious agents.
- Cost effective and eco-friendly methods like photo chemical degradation can be adopted for waste treatment.

**2. Future Research:**

The future research can focus on the following gaps.

- Extensive studies on BMW management in India can explore the untreated waste that is being mixed with municipal waste and develop strategies to eliminate such disposal.
- Qualitative and quantitative survey of the waste generated in whole towns/cities and at healthcare establishments is to be focused.
- Documentation of prevailing segregation, disposal and treatment facilities in all HCFs is to be reviewed.
- A thorough study on cost-benefit analysis for outsourcing and establishing in-house treatment facilities is to be carried out.
- The study can also be extended to assess attitude, knowledge, practices in all health care facilities among health care workers to protect them from infectious diseases.
- Studies on hand hygiene methods, needle stick injuries and occurrence of diseases are to be encouraged to minimize health risk.

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