

RESEARCH ARTICLE

Biomedical Waste Management and Criminal Liability: A Critical Legal Analysis

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Abstract:

Biomedical waste is that waste which is generated during diagnosis, treatment, immunization in health care institutions, laboratories etc. These waste generations are now on the increase with an increase in the number of patients which are found to be infectious and emerging as a major public health hazard in recent times. It affects the health of people causing infection through environmental pollution with various microbes, radioactive elements etc. Hence, this issue attracts the constitutional provision of Right to Life (Art 21.) bears connections with Environmental Protection Act, 1986 and Human Rights Act, 1993. Article 21 provides right to life and liberty and incorporates the Right to health and safety, a fundamental right. Mismanagement of biomedical waste and improper disposal of biomedical waste is a crime to the society causing severe threat to public health and the environment. Improper management of biomedical wastes inflict public health and the institutions or organizations causing such hazards to public health and damage to the environment should be brought under the Environmental Protection Act 1986 and dealt accordingly. This is a crime to humanity and the offenders should be booked as per law. Even the victims of such biomedical waste hazards should be considered for compensation. The government of respective states should hold the organization or institution responsible and accountable for causing public health and environmental hazards through concerned authorities i.e. the licensing authority and state pollution control board. The methodology here used is doctrinal and primary data collection through questionnaire and analysis. There is a need to treat such violations as a punishable offense under environmental and criminal law. Strengthening accountability mechanisms is essential for safeguarding environmental integrity and human life.

Keywords: Biomedical waste, health hazards, microbes, public health safety, healthcare facilities, CBMWTF

INTRODUCTION

Health and safety of health is the right to everyone irrespective of their religion, community caste and creed etc., without any discrimination and at appropriate time and in an affordable manner. Right to health and health safety is also a fundamental right as provided under Part-III of the Constitution of India, particularly the Article 21. Article 21 deals with the right to life and liberty which states, "No person shall be deprived of his life or personal liberty except according to procedure established by law."

WHO defines -Health is a complete state of physical, mental, social wellbeing and not merely absence of disease or infirmity.

Access to health involves four key elements; 1. non-discrimination 2. Physical accessibility 3. Economic accessibility and 4. Information accessibility. These elements are essential for providing hassle-free health services to all citizens in an affordable manner and without any harm neither from the institutional environment, biohazards nor from any pollution. Biomedical waste management is very significant to defend the environment and health of the people.

Though only a small portion of hospitals generated waste is biomedical waste, but it is very infectious in nature, which requires systemic disposal with caution and care to prevent spread of infection to general mass. Biomedical waste directly or indirectly affects the health of the people by spreading infection and causing environmental pollution with various microorganisms, radioactive substances, etc. released to the environment. It poses a threat due to various drug-resistant microorganisms, radio-active substances released into the atmosphere.

Biomedical waste is one such waste which causes degradation of the environment and enhances the air, water and soil pollution detrimental to public health safety. Health as human rights stand as a legal obligation on State, and the State is to ensure its people timely access to health care facilities which should be acceptable to the patient and at an affordable cost.

As is well known, that Environmental Protection Act came into force in 1986. The main objective is to protect and improve our environment and keep it free from pollution. Environment includes air, water, and land and the interrelationship which exist among and between water, air and land, and human beings, other

living creatures, plants, micro-organism, and property. Environment has a great impact on health, may it be of human or any other being. Environment must be clean and free from pollution to protect health. Polluted environment will cause lot of hazards to living beings. Environmental hazards may be physical, chemical or biological. Article 21 of the constitution of India also provides right to enjoyment of pollution free water and air for full enjoyment of life. Hence environmental law is a key part of any comprehensive public health system. It may be mentioned that under Section 8 of the Environment Protection Act, Central Government has also notified various specific rules. One such rule is Biomedical Wastes (Management and Handling Rule) 1998. The Ministry of Environment and Forest introduced Bio Medical Waste Management Rules with an idea to decontaminate the generated biomedical wastes and thereby to prevent spread of infections to mass people. The most important aspect of this Biomedical Waste Management is its segregation at source, category wise. Segregation of different types of wastes is of foremost importance- category wise in specific colour coded bins in colour coded non-chlorinated bags. After segregation these wastes are disposed in a way as per biomedical waste management specification, Biomedical Waste Management and Handling Rules 1998 revised in 2015, 2016 2018. The Supreme Court of India observed that there was no specific Environment Court to deal with environment related cases and hence subsequently National Environmental Tribunal was established which later on became known as National Green Tribunal.

The Prime Objectives

- (1) To analyze impact of health hazards arising out of improper disposal of bio-medical waste on public health and safety.
- (2) To highlight how biomedical waste mismanagement and discharge gives rise to criminal liability.
- (3) To study the remedial measures the victims or the public may have in case they get affected due to biomedical waste mismanagement.

Review of Literature

Since the doctrinal research method is adopted here to develop the present research article, certain literature has been studied which includes books, journals publications, etc. A few of such reviews of literature are as mentioned below:

- (1) **R. Martin**, "Law, and Public Health Policy", "International Encyclopedia of Public Health." 2008: 30-38. Published online 2008 Aug 26. doi: [10.1016/B978-012373960-5.00236-7](https://doi.org/10.1016/B978-012373960-5.00236-7), PMID: PMC7150113. Guest Editor (s): Harald Kristian (Kris).

In this article the writer expressed that the two most important tools to assist the states in protecting their

population against threats to health are public health policy and public health laws. But in case where compliance has not been successful than the policy may need heavier hands of law for implementation purpose, though law is not an appropriate mechanism always for achieving public health objectives. There should be voluntary compliance. In the article the researcher explored the possibility of public health policy and public health law and further examined how they might work together as dual mechanism for public health. The States have a moral and political responsibility to protect the health of their population. Public health law has been defined as a power and duty of the State to ensure the health of their people. Public health policy is determined by a process of consultation, negotiation and research which leads to a plan of action to achieve public health goals.

- (2) **Sonia Allan**, "Public Health Law and Public Health Policy" October 2016, DOI: [10.1016/B978-0-12-803678-5.00248-4](https://doi.org/10.1016/B978-0-12-803678-5.00248-4), **International Encyclopedia of Public Health** (pp.200-201), Edition: 2nd, Publisher: Elsevier.

In this research article the researcher dealt with public health law and public health policy which assist the State in protecting the threats to health to the people, preventing the diseases and striving for healthy population, here in the article, the researcher examines the respective roles of public health law and the State jointly influencing the health outcome. The researcher also explored the relationship between law and policy and provides examples of public health law and policy as dual mechanism for public health services. Here the supra-National and International public health law and public health policy is also taken into consideration to emphasize the importance of laws and policies that crossed the national domain. The inter-Governmental organizations and civil societies all may influence and affect law, policy and practice and in terms of the public health services.

- (3) **S HAZARIKA, AMIT YADAV, K S REDDY, PROBHA KARAN DORAI RAJ**, "Public health law in India: A framework for its application as a tool for social change." [The National medical journal of India](https://doi.org/10.1016/j.nm.2019.04.001) 22(4):199-203, Source PubMed

In this article the authors highlighted the nexus between law, public health and legal tools applicable to public health issues, it is mentioned here that there is a consistence intervention to address public health concerns in the past and there is a need for contemporary framework to use modern legal tools for complex health challenges with a endeavor to bring about a desire social change.

Medicine has gone beyond treating diseases to promoting health with policy intervention to bring about behavioral changes in individual at different

levels, medicine is a social science in the present-day scenario the authors felt that physicians or doctors need to understand the social implication and overarching role of the law. It is highlighted how to build or develop a framework of law from promoting public health goals.

(3) Lakshminarayanan Sunitha, Role of government in public health: Current scenario in India and future scope, J Family Community Med. 2011 Jan-Apr; 18(1): 26–30. doi: 10.4103/1319-1683.78635, PMID: PMC3114612, PMID: 21694957.

In this article the writer desired to discuss about the public health care in India under role of Government in public health based on epidemiological transition, demographical transition and environmental and social changes. Based on the principles outlined in Alma-Ata, 1978, there is an urgent need to revitalize primary health care to meet these challenges. The role of Government in population health is not limited to health only but it also spread over to various sectors outside the health system.

(5) Stephanie P.K, Bubela T, "Legal Issues in Public Health", International Encyclopedia of Public Health (Second Edition) 2017, Pages 384-390.

Here in this article the authors desired to depict public health law theory in the legal issues related to public health, role of government in creating a condition, conducive for people's health and to promote the health of the population. It also provides a framework to understand legal basics of enactment, legal issues in public health and operation on public health laws. It also desires to highlight the miss-alignment between legislation, regulation and policy and misuse of delegation.

In this research article the researcher has dealt with public health law and public health policy which are fundamental tools to assist the state in protecting the threats to health to the people of the state, preventing the diseases and striving for healthy population, here in the article, the researchers examine the respective roles of this two and the joint role in influencing the health outcome. The researcher also explored the relationship between law and policy and provides examples of public health law and policy as dual mechanism for public health services. Here the supra-National and International public health law and public health policy is also taken into consideration to emphasize the importance of laws and policies that crossed the national domain. The inter-Governmental organizations and civil societies all may influence and affect law, policy and practice and in terms of the public health services.

Methodology

To ensure quality information on the topic and deeper understanding of it, the study will be doctrinal and analytical. The study primarily relies on secondary

sources such as books, journals, research articles and other web sources.

Key Words Explained

(a) Biomedical Wastes (BMW): it is the waste, which is generated during diagnosis treatment, immunization of the human (as well as Animals) in health care facilities, laboratories etc. These wastes include soiled linens, swabs, bandages, used syringes and needles, body fluids and anything which get contaminated and are source of infections, they may also be called infected hospital waste or biomedical waste.

(b) Health Care Facilities: Health Care facilities / institution or Hospitals are places to provide treatment of patients with diseases and also for diagnosis of diseases using different instruments and equipment etc.

(c) Public Health Safety: Public Health Safety can be defined as the science of recognition, evaluation and control of hazards that can affect or impair the health and well-being of the Public for which necessary protection should be taken for the safety of public health.

(d) CBMWTF: Common Biomedical Waste Treatment Facility is a setup or establishment as per Biomedical Waste (Management & Handling) Rule 2016 for proper treatment and disposal of such wastes generated from health care institutions to reduce its unwanted effect on human beings, animal kingdom as well in the environment.

The BMW: A Great Threat to Public Health Safety

Biomedical waste, if not properly managed and disposed of, may amount to be a great threat to public health and safety. The scenario is becoming grave day by day along with the development of new technology used. The improper disposal of biomedical waste may cause variety of infectious diseases. For example, HIV virus, hepatitis B viruses are the most common and dreaded viruses appearing at the top of the extensive list of infectious agents which spread through BMW prior to its disposal, if not properly and carefully handled. Other diseases which often spread due to improper management of biomedical wastes, are tuberculosis, pneumonia, whooping cough, diarrhea, dysentery, Upper Respiratory Tract Infection (URTI), urinary tract infection, bronchial asthma, kidney diseases like acute nephritis, hepatitis A (jaundice), birth defect, congenital malformation etc. Needle stick injury is another most dangerous hazard of biomedical waste, especially for the waste handlers and health care providers and bear potential risk of spreading of HIV Aids infection, Hepatitis B & C. There is also maximum chance of spreading nosocomial infection to the patients, hospital staff as well as to the visitors of hospital and thus beyond health institution premises. The greatest danger of biomedical waste lies not in the waste itself but in its improper disposal and treatment.

Emission from waste disposal may have negative impact on the environment, which in turn leads to skin

infection, respiratory diseases like allergic bronchitis, bronchial asthma, cancer, heart-related condition etc.¹ Improper disposal of biomedical wastes may bring danger to humans, animals, birds and air, water & soil as well. The fumes from the incineration due to improper treatment can badly affect the environment and pollute it to such an extent to affect human health, animal and bird and plant kingdom. Improper disposal of biomedical wastes into the soil causes harm to the soil and water bodies affecting the aquatic kingdom. Radioactive particles released out of biomedical waste into the air, water and soil, may be causative factors for congenital deformity, cancer of skin, lung and blood

Improper and illegal dumping of biomedical waste has maximum impact on the environment - the soil, ground water, lake, river, stream which all get polluted. The quality of soil gets degraded, and air becomes polluted due to open burning of biomedical wastes. Further, handling biomedical waste by the health workers can seriously affect the health not only of the waste handling staff but also the health of doctors, nurses, maintenance and sanitation personals and outsiders visiting the health care facility. Hence, it may be inferred that improper biomedical waste management has direct effect on human and animal health, environmental pollution and also spread of infectious diseases into the community, the animal, birds and aquatic kingdom. This ultimately leads to public health risks, economic losses and finally legal consequences.

Biomedical waste constitutes only 15-20% of the total waste generated in the health care facilities. Though, it is a small amount in comparison to the other waste generated in the health care facilities, it requires special care for its disposal and management because it is very harmful to the public health and our environment unlike other waste generated in the health care facilities during diagnosis, treatment and other procedures. Hence, they need to be taken care of and should be handled, disposed and treated as per biomedical wastes handling and management rules (BMWH&M) 2016.

Biomedical wastes or hospital wastes need appropriate segregation, collection, storage, transportation, loading and unloading of the wastes and finally disposal for necessary treatment of the wastes in common biomedical wastes treatment facility (CBMWTF) as per guidelines of Bio Medical Wastes (Management & Handling) Rules 2016 from Central Pollution Control Board, Govt. of India; Ministry of Forest, Environment & Climate Change combined with ministry of Health & Family welfare, GOI. Hence, management of the biomedical wastes generated in health care facilities should be such that the wastes thus generated should

not harm the environment as well as human health at any cost.

It may be mentioned here that the waste generated in the health care institution consists mainly of patient's blood, secretions, laboratory discharges, chemicals, sharp materials, body fluids, soiled linens etc. As per the biomedical waste (management & handling) rules 2016, biomedical wastes are placed in four categories with their color codes, such as: (1) Yellow category, (2) Red category, (3) White category and (4) Blue category. Yellow bin is meant for human & animal anatomical wastes: (i) Soiled linens, (ii) Expired medicines, (iii) Laboratory wastes and Chemical and other liquid wastes, (iv) Discarded blood and body fluid. Red bin and bag are meant for contaminated plastics: (i) White for sharp metal wastes; and Blue is meant for glass waste and all types of implants.

Bio medical waste generated in India is 1-2kg per day per patient in hospital. In Assam it is up to 4kgs per day per patient in government hospital. It is highest in Karnataka with average amount of 77.5 tons/day and lowest in Arunachal Pradesh with 0.4 ton/day.

Precautions to Avoid Unwanted Situations

In order to protect public health safely or make the environment free from any kind of injury caused by public health institutions or hospitals in the nearby areas around it or to any individual and property, certain precautions are required to be taken.

(1) Collection of Biomedical Wastes

Biomedical waste should be collected properly on daily basis from each ward of the health institution. The institution should ensure it and at the same time should also ensure disposal of anatomical waste and soiled waste within 24 hours. The general waste should not be collected in the same trolley at the same time as biomedical wastes to avoid mixing up of both. And storage of the biomedical wastes should be minimized in the department or inpatient or out-patient wards.

Another precaution to be taken is that no biomedical waste bag or bin should be filled more than $\frac{3}{4}$ th of its capacity. The colour coded bags and containers should have biohazard symbols on them, labeled with date, quantity, sender's address, receiver's address etc., and bar code to trace them when necessary. The symbol of Biohazard or cytotoxic hazard, as the case may be, should be disposed of, as per Biomedical Waste Management & Handling Rules 2016.

At the same time, bar code labels should be provided on all colour coded bags and containers on segregated wastes prior to sending them for final disposal in accordance with Central Pollution Control Board (CPCB) guidelines prescribed for "Guidelines for

¹Megan Chamberlin Nov. 2020. (Denial health .com)

barcode system for effective management of biomedical wastes”.

Every health institution should keep the record of BMW generated and disposed category wise, mentioning the date, time and quantity and also mentioning the collection and handing over time with further mentioning of the quantity and quality i.e. type or category of wastes. A weighing machine should be provided at the collection store in the institute having 30 or more than 30 beds as per specification given by CPCB guidelines.

An annual record of biomedical wastes generated, disposed, training on biomedical wastes management, health checkup of the waste handlers and their immunization status, meeting of biomedical waste management committee, operation of biomedical waste treatment equipment, testing of effluent generated from the health care facility etc, should be submitted to SPCB (State Pollution Control Board) or PCC (Pollution Control Committee) and all these records are to be preserved for minimum of five years.

(2) Deep Burial Standard

It is also equally important to maintain a deep burial standard for biomedical waste. The health institution which does not fall under any CBMWTF area can dispose of their biomedical wastes after proper collection into concrete deep burial pit inside the premise as per specification given under BMW Rules 2016. Yellow waste like human anatomical parts, animal anatomical parts and soiled linens are allowed deep burial in case of health institution situated at remote areas where CBMWTF is not accessible with proper authorization from concerned SPCB/PCC. The pit for disposing biomedical wastes has separate specification as per Biomedical Wastes Handling Rules. The pit should be away from habitation and care should be taken so that the waste does not contaminate any surface and underground water. Sharp waste before disposal into concrete pits should be shredded and disinfected with autoclave. Once the pit is 3/4th filled up, it should be completely covered with concrete slab.

(3) Effluent Treatment Plant

Every health institution should have one effluent treatment plant (ETP) as per effluent standard prescribed in BMW Rules 2016. The effluent from laboratories, washrooms, washing from patients' floor, washing of linens etc., should be collected separately and pretreated before mixing it with rest of wastewater from health institution. The combined wastewater should be treated in three stages: (a) first step: equalization, neutralization, precipitation and clarification, (b) second step is aerobic biological treatment, and (c) the last stage: pressure filtration, disinfection and finally letting them drain. This treated effluent can be reused in horticulture, flushing, and scrubbers etc.

(4) Biomedical Wastes Generated in Outside Activities

The biomedical waste generated in outside activities should be segregated at the site itself and it is either brought back to the health institution and stored in the collection store and disposed as per rule or may directly transported to CBMWTF from the site of generation. In case of immunization under UIP (Universal Immunization Programme), the same procedure as activities outside can be followed. The needle of the AD syringe is to be destroyed with needle cutter and to be put in puncture proof translucent container. The syringe and unbroken vials should be transferred to red container.

Liability of health Care Institutions

The liability of implementation of Biomedical Waste Management Rules 2016 lies with the person having administrative control over the health care institution. He or She is to ensure that biomedical wastes generated in the health institution is being properly segregated, handled, stored, packed and transported to CBMWTF or to burial pit and sharp pit within the premise whatever it may be hassle free as per norms without any adverse effect to human health or the environment. Finally, biomedical wastes management and treatment can be shown:

- (i) Waste segregation in colour coded bags and bins at the point of generation →
- (ii) Pre-treatment of infectious laboratory wastes in the institution →
- (iii) Transportation of segregated wastes into the store area →
- (iv) Temporary storage of the wastes inside the institution premise →
- (v) Treatment and disposal of biomedical waste through CBMWTF.

The wastes as mentioned earlier may be solid, liquid which includes various toxic chemicals, microbes and even radioactive substances and they need special segregation, collection, treatment and disposal considering the safety of human health as well as safety of environment.

The BMW: The Criminal Liability

Mismanagement of Biomedical waste causing injury to health and property is, no doubt, one important aspect of crime, giving rise to criminal liability assigned to the occupier or the authority of the health institutions managing and controlling it. Many countries do not either have appropriate regulations or do not enforce them, which can result in environmental and public health hazards associated with improper biomedical waste management. As indicated above, insufficient financial and human resources are also major contributing factors to improper biomedical waste management, posing environmental and public health risks. Adequate training in proper waste management is crucial to preventing accidents and promotes

compliance with regulations. Initiatives have been taken directly or indirectly even in those countries through judicial activism or some regulatory measures.

So far India is concerned; no direct legislation has been passed to regulate biomedical waste management. But if looked back to the history of Indian legal and constitutional development, it becomes clear that India had already such legal provisions to prevent illegal activities or omissions committed by the occupier or authority of health care institutions causing harms to the individuals or society at large, particularly in Section 268 of the Indian Penal Code, 1860 (now replaced by Sec 270 of BNS 2023) since the British colonial era which could be applied to cover Biomedical Waste Management. At present, improper biomedical waste management and disposal is considered to be an offence coming under the category of public nuisance under section 270 of the Bharatiya Nyaya Sangita, 2023. Section 270 of BNS defines Public Nuisance, “A person is guilty of a public nuisance who does any act or is guilty of an illegal omission which causes any common injury, danger or annoyance to the public or to the people in general who dwell or occupy property in the vicinity, or which must necessarily cause injury, obstruction, danger or annoyance to persons who may have occasion to use any public right but a common nuisance is not caused on the ground that it causes some convenience or advantage”. As per section 271 BNS 2023, it is also a negligent act likely to spread infection of disease dangerous to life. Section 271 of BNS further says, “Whoever unlawfully or negligently does any act which is, and which he knows or has reason to believe to be, likely to spread the infection of any disease dangerous to life, shall be punished with imprisonment of either description for a term which may extend to six months, or with fine, or with both”.

This clearly indicates that improper disposal of biomedical waste is an offence affecting public health safety. Any spread of infection of diseases dangerous to public health shall be punishable with imprisonment of either description for a term which may extend to 2 years or with fine, or with both, under Section 272 of BNS 2023. Similarly, it has been said that improper biomedical waste management/ disposal making the atmosphere noxious to health of a person dwelling in the neighborhood shall also be punishable with fine which may extend to ₹1,000/- under section 280 BNS 2023.

Thus, improper biomedical waste disposal and management seriously affect not only public health but also the environment as well. The institutions or the health care centers which are found guilty of improperly disposing the biomedical waste causing harm to the public health as well as the environment, should be punished as per law. But on the other hand, the public health suffering from improper disposal of such wastes and at the same time environment affected from this

kind of improper disposal of BMW should also be well compensated, because the act of improper disposal is a public nuisance and dangerous to public health safety which is a crime to society as well as to individuals.

Criminal Court Jurisdiction and the Procedure

As seen above, public nuisance is defined under Section 277 to 290 of the Bharatiya Nyaya Sanhita, 2023 (earlier IPC Sections 268–290). It refers to any act or omission that causes common injury, danger or annoyance to the public or people in general. It includes offences that affect public health, safety, convenience, decency, or morals, such as polluting a water body, causing air pollution, noise nuisance, or obstructing a public road. As for instance, discharging untreated industrial waste or biomedical waste into a river/ stream affecting drinking water supply constitutes public nuisance under BNS as well as environmental law.

The cases of public nuisance are tried in criminal courts under the Code of Criminal Procedure, 1973 (now Bharatiya Nagarik Suraksha Sanhita, 2023). The Magistrate of the First Class or Executive Magistrate/Sub-Divisional Magistrate (SDM) has jurisdiction under Sections 133 to 143 CrPC (sec 133 of Crpc in BNSS as sec 152 and sec 143 in Crpc in BNSS as sec 163) to take preventive action.

In Assam, these powers are exercised by Executive Magistrates appointed by the State government, such as Deputy Commissioners, Additional DCs, etc.

The court follows the Summary Procedure (Section 142 CrPC). Under Section 142 CrPC, the Magistrate may immediately enforce action, such as shutting down operations or removing obstructions, if the nuisance poses imminent danger to health or life. This is particularly useful in cases of environmental emergencies, like chemical leaks, toxic air emissions, or illegal dumping.

Police Role and FIR in BNS Offences

If the nuisance amounts to a cognizable offence under the Bharatiya Nyaya Sanhita, the police can register an FIR and investigate under the Bharatiya Nagarik Suraksha Sanhita (BNSS). For example, Section 281 BNS, similar to old IPC 277, punishes pollution of water bodies, which is punishable with imprisonment. The police files a charge sheet, and the case is tried before a Judicial Magistrate First Class in criminal court.

Environmental Law and Special Courts

If the act causing public nuisance also violates environmental statutes, such as, Environment (Protection) Act, 1986, Air (Prevention and Control of Pollution) Act, 1981, Water (Prevention and Control of Pollution) Act, 1974, and Wildlife Protection Act, 1972, etc., the matter may be brought before the National Green Tribunal (NGT) for civil liability, compensation, and restoration of the environment. Assam falls under the NGT Eastern Zone Bench (Kolkata) or the Principal

Bench (Delhi) for cases involving cross-border pollution or serious environmental damage.

In addition to criminal proceedings, citizens or organisations can file a Public Interest Litigation (PIL) under Article 226 before the Gauhati High Court (for Assam), or under Article 32 before the Supreme Court, for constitutional remedies against public nuisance affecting health, life, or environment (Article 21). The Courts have already issued binding orders to curb

CONCLUSION

Biomedical waste is very hazardous in nature. It not only affects the human health but also very much detrimental to the environment. This issue has cropped up in recent years and not much attention has been paid towards it. Now, it has come up as one of the most hazardous and dangerous socio-legal issues of recent times and it needs to be addressed with utmost sincerity. Lack of awareness and knowledge regarding biomedical waste is a major public health issue at present.

Biomedical waste, if not handled and managed properly, then it can cause havoc to the society by spreading various infectious diseases to the community and affect the environment badly with land, water and air pollution which in turn affect the animal, plant and aquatic kingdom.

Biomedical waste mismanagement is a multidimensional challenge involving legal, institutional, environmental, and ethical failures. While India possesses a robust legal framework, the absence of effective enforcement, lack of awareness, and poor infrastructure negate its impact. Legal remedies must therefore be proactive, incorporating not just punitive but also preventive and restorative strategies. The Indian model must evolve from mere compliance to a culture of responsibility, transparency, and sustainability in biomedical waste governance.

Now it is the need of the hour to combat such hazardous effects of biomedical wastes to society as a whole with proper management and disposal of biomedical wastes by the concerned organizations with utmost sincerity and at the same time there must come out some stringent laws and rules to overcome such menace.

Recommendations

To address existing shortcomings, the following legal reforms are suggested:

(a) Strengthen penalties: Amend the Environment Act to include enhanced penalties for habitual offenders, including suspension of licenses.

(b) Compensation framework: Introduce a statutory compensation mechanism for victims affected by biomedical exposure.

(c) Strict liability: Apply the polluter pays principle and absolute liability, as affirmed in *Vellore Citizens' Welfare Forum v. Union of India*, (1996) 5 SCC 647.

pollution, illegal mining, deforestation, and industrial contamination. For example, in *M.C. Mehta v. Union of India* (1987 AIR 965), the Supreme Court dealt with public nuisance caused by pollution of the Ganga and established the principle of absolute liability for hazardous industries. This ensures a comprehensive legal remedy and enforcement mechanism to protect public health and the environment.

(d) Environmental Courts: Establish fast-track green courts at the district level to handle biomedical waste cases under the aegis of the National Green Tribunal Act, 2010.

(e) Mandatory training and certification: Healthcare professionals and workers handling waste must undergo mandatory legal and procedural training.

(f) Enactment of a Specific Legislation: A specific legislation touching directly these issues should be passed.

Therefore, it becomes necessary that healthcare institutions or hospitals should be kept under regular surveillance by the competent authority, and any such institution found violating the proper biomedical wastes management norms should be booked under the provision of law and should be punished as described by the law. At the same time adequate compensation also should be granted for causing harm to public health, individuals or to maintain the environment properly and safely suited for living. Otherwise, it will be difficult to combat this menace in future.

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