

# Problems faced in Biomedical Waste Management.

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*Its purpose is to enhance our vision towards the society and suggest some ways to improve certain consequences faced by it. The concept has helped us in thinking, analyzing, suggesting and designing the solutions to the problems. It has helped us to incorporate certain skills as well like, better interaction with society to understand their problems and also, the team-building ability, to work as a whole for the project.*

**“Problems faced in Biomedical Waste Management”.**

*We're thankful to many people, Hospitals and Organizational Industries for their humble assistance and co-operation for carrying out our project successfully.*

## Chapter 1: Overview of Biomedical Waste Management

### BACKGROUND:

**Initial Visit** – We planned to visit a Hospital to gain some basic information. Although we weren't permitted to view the Waste Management in the Hospital without a letterhead of our Institute, we could still view few basic issues.

### Our Observations(including problems) -

- 1] The distributed waste bins were left uncovered
- 2] No fast disposal
- 3] The waste bins would be accessible by any person
- 4] Absence of any plant for processing the waste

### Observations in Detail-

#### 1] The distributed waste bins were left uncovered.

Although the Hospitals do follow the rules of distributing the waste according to their nature, the waste bins in 3 out of 5 hospitals were kept open, which is a common careless mistake. It may affect the patients or people present in the Hospital. Although we couldn't view all waste bins, we sighted them generally.

#### 2] No fast Disposal

The waste is not disposed or at-least collected in the Waste-Box with less than 24 hours intervals as per our interaction with one of the Hospital workers. Also, there's no special staff assigned for storing or maintaining the Waste Management of the Hospital. We observed the bins totally filled.

### 3] The waste bins would be accessible by any person

The open way of keeping the waste bins in the Hospital premises is absolutely incorrect. Any person may access or touch it and no-one wouldn't know it. It might prove to be hazardous as there rises a possibility of any patient or person trying to access it with some thought. And especially in the psychiatric hospitals, it's a must look issue.

### 4] Absence of any plant for processing the waste

We couldn't view any processing plant in the Hospital premises. Although we couldn't see everything in the Hospitals, our eyes couldn't hover over any of such plants.

### Current Situations and Problems faced by Community:-

- 1] Easy spread of diseases even after taking the measures to prevent it.
- 2] The pollution in the river bodies or overall pollution due to the Hospital Wastes.
- 3] The neighborhoods surrounding the Hospitals face issues of odour or even diseases sometimes.
- 4] Improper treatment of wastes even after processing through the special Biomedical Waste Treatment Plants.

### Key Findings:

- 1] We'll try to research more about what's the actual process of the waste in Hospitals we visited.
- 2] We found few small faults in storage of wastes in hospital.
- 3] We'd focus on one of the major issue, i.e., absence of any individual Hospital Plant for processing the Waste.

### **SOCIAL ISSUE:**

After interacting with people living around the Hospitals as well as the general public to give their opinions, we found out that they face many negative effects of the current Biomedical Waste Disposal System.

### **Details of the Stakeholders:**

#### **Primary Stakeholders:**

We, as implementing group to find solutions to problems

People play vital role as society to help us in solving the problems faced by them.

Friends have to give us feedback whenever required and help in making decisions.

#### **Secondary Stakeholders:**

The Hospital Management, to guide us through the basic processing Biomedical Waste Plant authorities, to show the higher processing

College Staff, to guide and help us for whatever we need to work for our project

**CONCLUSION:**

We decided to explore the whole Biomedical Waste Management System and find out the solutions to the problems faced by society.

**Chapter 2: Entirety of Social Issues****Problem Analysis:**

The Biomedical Waste is one of the most hazardous wastes which are emitted daily from the Hospitals. More than 500 tonnes of Biomedical waste is generated everyday in India. Although we can view the entire proper Waste Management System particularly for the Biomedical Waste, as governed by certain rules and regulations, we still experience problems as a society.

After interacting with few people, friends and after having the initial visits to the hospital, we realized the circumstances still faced by the society. As we've noted the problems faced by the community in chapter 1, the society is facing problems due to some or other problem faced in the whole Biomedical Waste Management.

According to an article published by the Times of India, the Biomedical Waste is growing by 7% annually. Also, every year, there are reports about the improper disposal of the biomedical wastes. The wastes have been found under the beach, in some marshy areas, etc. And it might pollute the water bodies and thus, the people!

The pollution grades of the toxic gases released are also very high. The incinerator plants are used to process the biomedical waste, along with the other wastes. The incinerators used by the industries, specifically in our nation do release lot of gases which are toxic in nature and be it in small amounts daily, it's polluting our environment. Also, it's kind of a risk for people who reside within certain area around the incinerator plants.

To find out the core problems, reasons and solutions, we did the SWOT Analysis...

**SWOT Analysis of the current Biomedical Waste Management****Strengths**

Decreases and processes the Biomedical Waste in a good way Incinerators process the wastes in form of gases  
Decrease in Solid Waste pollution

Decrease in probabilities of disease spread by solid wastes

**Weaknesses**

Emission of toxic gases

Chances of improper disposal

Release of toxic sewage if sewage treatment plant lacks even a bit High Risks if failed anywhere

Absence of Plants in Hospitals

**Opportunities**

Finding a way to ensure least chances of improper disposal creating a system which ensures reuse of the emitted gases decreasing the risks by establishing a more classified system

**Threats**

Mass pollution Spread of severe Diseases

Hike to Environmental Concerns like, Global Warming Very severe causes like, cancer, deaths  
Neighbourhood of Hospitals suffer

**Issue Based Problem Analysis**



The above picture depicts the *Problem analysis* with the help of a tree.

Every part shows a different factor for the problem. **Roots**- Highlight the Reasons for the Problem **Stem**- Highlights the Core Problem **Leaves/Branches**- Highlight the Outcomes of the Problem

### **Explanation to each factor related to the Problem**

#### **Reasons behind the Problem**

##### **1] Absence of Individual Plants in the Hospitals:**

As of current scenario, there's no special incinerator in Hospitals except for the sterilization in Sodium Hypochlorite Solution. Absence of Individual Incinerator is one of the major reasons to be focussed in the whole process of the Biomedical Waste Management.

##### **2] Improper Disposal:**

Even after the laws laid down for the proper disposal of the Biomedical Waste, it's still seen floating in the rivers, dumped in beach somewhere. It has sometimes even crossed the limits by affecting the people through the water they use due to the contamination of water because of disposal of such harmful wastes in it. The clinics or hospitals at some part of our nation are still trying to dispose the stuffs off illegally.

##### **3] Toxic Gases:**

The Incinerators release toxic gases even after all of the chambers which prevent the release of toxic gases from the chimney. The gases can become a cause of very severe diseases like Cancer or Respiratory infections. The emissions are harmful for both, life of us, animals as well as the Environment. The pollution concerns are on a rising verge.

##### **4] Failure Risks:**

The Incinerator Plants are full of risks. A minute failure or a problem might prove deadly! So, although the Plants have all the safety requirements, there are still the chances of problems and thus, if these problems occur, they'll destroy the mankind surrounding the plant as the waste inside is extremely toxic!

#### **Conclusion:**

The big, common Incinerator plants for the Biomedical Wastes prove to be harmful in many ways. There are lots of concerns regarding it's authenticity.

## **Chapter 3: Implementation of Problems**

#### **More Visits!**

We decided to visit the Hospitals with the letterheads and also, we contacted the person in charge of the Incinerator Plant to give us details about how their plant works.

We again visited the same Hospitals as our Initial Visits. We suggested some basic improvement points to them like, covering the Bins, keeping the Bins containing harmful waste, out of reach of patients etc.

They showed us the various types of Wastes, separated according to their classification in different bins. We asked the processing information to the person in-charge of the Incinerator and Biomedical Waste Plant. So, here's the classification with the further processing information:

1] *Yellow Bag*: Human Anatomical Wastes, Soiled Wastes, Expired and Discarded Medicines, Chemical Waste and Micro-Bio Waste  
*It's processed in Incinerator.*

2] *Red Bag*: Saline Bottles, I.V. Set, Empty Urine Bags, Syringes, Empty Medicine Glass bottles, Gloves, Plastic Water Bottle  
*It's first Chemically Disinfected by using the Sodium Thiosulphate and then processed through the Shredder.*

3] *Cream Bucket*: Needles, Blades, Syringes and other Sharp Wastes *It's firstly chemically disinfected and then, processed into shredder.*

4] *Cardboard Boxes*: Ampoules, Empty glass containers, bottles, etc.

*Ampoules are again processed through Shredding while, the glass containers and bottles are disinfected very properly and sent to the respective industry for recycling it. For example, the glass is disinfected, sent to the glass industries where, they're again disinfected at high temperatures and then remoulded into glass items.*

5] *Black Bag*: Empty Medicine Boxes, , Paper waste, fruits or food item wastes, tea cups etc., like general wastes.

*These are processed in an ordinary way as it's the general waste.*



After the initial separation of Wastes inside the hospital building, it's later stored in a separate Biomedical Waste Box. The Biomedical Waste Processing plant picks the waste from the Waste Box.

### **Solutions for the Problem**

#### **Overlook of the Solutions found:**

- 1] Establishing individual, big Incinerator and Shredding plants inside Hospital premises.
- 2] Establishing Energy generation plants to transform the released gases into a source of energy.
- 3] A separate Staff for managing the Waste Management inside the Hospital.

- 4] Certain regulations to be put to decide some range of distance to be kept for the hospitals from the social neighbourhood.
- 5] Spreading the message of awareness among the Hospital Staff and the Hospital Management System.
- 6] Establishing a small incinerator and shredder in a separate room without any access.

### **SWOT Analysis of each Solution**

#### **1] Establishing individual big Incinerator and Shredding plants**

##### **Strengths:**

Faster processing of wastes

No need to transport the waste Less storage concerns

Less chances of disease spread

##### **Weaknesses:**

Very high Costs

Release of toxic gases Consumes lot of area High maintenance

Risky

##### **Opportunities:**

Job opportunities for managing the plants

Job opportunities for building so many plants

##### **Threats:**

High Investment costs for Hospitals

Very Harmful for society living around the Hospital High risks

##### **Advantages:**

Decrease in possibilities of spread of the diseases.

Decrease in Society's concerns of foul or uncomfortable smells due to the solid wastes.

No need of the disposal trucks to carry waste far away to the incinerator plants.

Quick waste management.

##### **Disadvantages:**

Might lead to severe diseases through the toxic gases released. It's very costly if we think from the hospital's point of view.

Vast lands consumed in setting up the plants might prove a bit tedious.

#### **2] Establishing Energy generation plants to transform the released gases into a source of energy**

**Strengths:**

- No harm of toxicity of gases
- Less use of Chemicals required for processing the waste into gases within the plants
- Less amount of fuel required to process the plant
- A way to generate Energy

**Weaknesses:**

- High Costs for establishing the Energy generation plant over the present Waste management plant
- Again, there's a risk of rupture of the generation system
- The capacity to hold the high amounts of Energy would require another station, consuming more space
- Government policy may be improper and might not support the idea.

**Opportunities:**

- Chances of new innovational project
- Employment for the management of plant
- Decrease in the amount of waste stored in Hospitals

**Threats:**

- Very high economical necessity
- Might provoke social revolts for the land reserved for the plant
- Increase the risks in high energy management as the energy generated would be in high amounts.

**Advantages:**

- Ecofriendly, doesn't cause pollution.
- Increase in power generation.
- Decrease in diseases spread.
- Decrease in the Environmental concerns.

**Disadvantages:**

- Might affect the people working in the plant through severe diseases.
- Has very high maintenance due to the connected large plants.

### 3] Establishing a small incinerator and shredder in a separate room without any access

#### Strengths:

- Faster waste processing
- Lower cost compared to other solutions
- No toxic gases released
- No necessity of storing the wastes for long time in hospital

#### Weaknesses:

- Needs a separate specific space, out of reach of anyone except Hospital staff

#### Opportunities:

- Appoint a special staff for collecting and processing the waste through the Incinerator and Shredder.
- Innovative again since, it's a new technology and might help in increasing the scope of Biomedical waste management in a better way.

#### Advantages:

- Eco-friendly process
- No problems to the society for the foul smell
- No need to store the waste for longer time
- Low social issues
- Least diseases spread

#### Best Solution from all Solutions

After revealing many details of all the solutions, we found out the best solution as the “Establishing a small incinerator and shredder in a separate room without any access”. We went through many measures and effects of all the solutions and studied the details with observations.

Before discussing the outcomes, requirements and implementation of the plant, we'd like to share some of our insights to show our visits and work:

#### Pilot Implementation

As we've selected our solution, we plan to implement it in a way. Although, we can't implement physically by ourself, we tried to suggest it to people. Our implementation is a plan, a suggestion for the better cause. If implemented, it'd have better effects. So, let's see how our solution can be implemented.

#### Plans for Implementation of our Solution

- Buying an small Biomedical Incinerator

- Buying a small Biomedical Shredder
- Decreasing the stake of waste production
- Decreasing the possibilities of spread of diseases
- Decreasing the social concerns about the Hospital wastes
- Decreasing the unnecessary, improper disposal of wastes
- Decreasing the slight possibilities of improper processing through the processing plants.
- Decreasing the Environmental concerns due to less emission of toxic gases.

Along with above points, we'd like to explain our point a bit. Our plan is to establish small incinerator and a shredder in the Hospital itself. The space needs to have the denial of access to general public so as to avoid the slightest risks. When the waste processed out of Hospital turns into ash, it'd be disposed of neatly through proper channel as per the norms set by the Government and it's laws. The solution is ethically appropriate and chosen with due care.

#### **Help of Partners**

- Help of the Hospital staff as well as the management to explore the Hospital's waste management system.
- Help from the Person in Charge of the large Biomedical Waste Plant situated in the to get the details about processing of wastes.
- Help of our Social Innovation tutor to identify the problems and implement our ideas properly.
- Information collected from the friends and teachers in general
- The co-operation of group members to perform the provided task with responsibility.

#### **Budget and Funding Details**

- The cost of a small Incinerator is with some medium capacity is around Rs. 40,000.
- The cost of a small Shredder with the capacity of processing around 25 kg of sharp and plastic wastes is around Rs. 2.5 Lacs.
- The separate room for both Incinerator and Shredder might have some maintenance as well as a Three-phase supply. So, some more costs of around 20,000 per year need to be considered.
- If we're allowed, we'd propose the idea of funding through the Government investments for the Hospitals set up and also, set it as a necessity.
- As per our calculations, including extras, the total budget would be around 4-6 lacs.

#### **Duration**

- Buying an incinerator or a shredder by Hospitals individually wouldn't take any time.
- Although, the interest in buying them depends upon the economic conditions or the funding of the Hospital individually.
- If proposed to the Government for the compulsive implementation, with over 50-60K Hospitals, it'd take around 5 years for the implementation in all of the hospitals.

**Ethically genuine??**

Our solution is ethically genuine since, it's only going to be reforming for the Waste management system and influentially better for the environment as well as most importantly, The Society!

Due to least amount of pollution concerns, our solution has ethical thought as well. Also, it does recognize the social concerns. The implementation is only going to reduce the chances of spread of diseases, wouldn't require more than a single big room and after all, a measure worth it.

With no social, environmental and even economic consequences, it's a noteworthy way to implement.

**Feedback from Stake-holders****Conclusion****Learning and Innovation**

- We created a vital suggestion for implementation of our selected solution which would improve the current Biomedical Waste Management System.
- We learned the entire Biomedical Waste Management System and it was a new experience for us.
- We discovered some innovations like, small Incinerators and shredders which are available since some recent years.
- Again, we suggested a innovative method of trying those small Incinerators and Shredders which are not very much known to everyone.

**Scope**

- Our project highlights the essential scope for improving the Waste management system in a better way.
- The Biomedical Waste Management does possess deep scope of improvement even after implementation of our solution. It's a vast system and, the problems wouldn't reduce without more and more awareness about this subject.
- It's an emerging field these days. The management of waste is itself a very promising new field and into that, Biomedical Waste management has huge importance.

**Limitations and Challenges**

- We faced the complicated process, having the permission and other necessities which consumed large amount of time.
- Our team faced the problems of doing things together for the project.
- Due to the lack of space and time for creating the project, our team's single member along with other member's help had to create the entire project after practical visits by all of us. We couldn't do it together due to our residential consequences as well as the lack of time to do it during our academic sessions.
- We faced the challenges of persuading the Hospital Management before getting the permission to explore their Hospital.
- Although we had contacted the person in charge of Biomedical Waste Management plant situated, we couldn't get the full access to discover their plants. All we got were the details and a overlook. It'd have taken another month to gather the permission to explore their plant.