

JOURNAL OF BIOCHEMISTRY PHARMACOLOGY AND PUBLIC HEALTH

Volume: 3 Issue: 1

January-March, 2025

ISSN-2958-762X



DOI: <https://doi.org/10.5281/zenodo.14928799>

Research Article



KMF Publishers
www.kmf-publishers.com/jbpph/

OPEN  ACCESS

Assessment of medical waste management by hospitals of Dhaka city

Sharmin Haque Prima¹, Sabrina Binte Shahadut¹, Md. Younus Ali¹, Quanita S. Saleque¹, Nibia Sharmin¹, Faysal Mollah¹, Shamim Reza¹

¹Department of Public Health, University of South Asia, Bangladesh

ABSTRACT

Hospital waste is produced during healthcare activities, such as treating, diagnosing, and immunising humans or animals or doing study/research activities. Improper handling of medical waste, common in Bangladesh, could adversely affect the hospital environment and community and seriously threaten public health. This study is aimed to assess the knowledge and practices regarding medical waste management (MWM) among healthcare providers (HCPs). This cross-sectional study was carried out to evaluate the medical waste management level of Dhaka city hospitals. We estimated the sample size through simple random sampling and used both open & close-ended questionnaires for data collection. The Data were collected using a self-administered questionnaire. Informed consent was taken from all the participants. Then, the data analysis was done using SPSS. We use the sources of health care waste: Government hospitals, Private hospitals, Nursing homes, Physician offices, Dentist offices, Dispensaries, Mortuaries, Blood banks and collection centres, Animal houses, Laboratories, and Research organisations. The study population was health professionals at a Dhaka City, Bangladesh hospital. Through face-to-face interviews, three hundred seventy-nine sample sizes were selected to assess the Knowledge, Attitude, and Practice regarding hospital waste management. The strengthening and expanding of ongoing educational programs/training is necessary to improve knowledge, attitudes, and practices regarding MWM.

ARTICLE HISTORY

Received 6 January 2025

Revised 15 February 2025

Accepted 20 February 2025

KEYWORDS

Health and environmental impact, Waste disposal, Infection control, Waste management policy, Public health risk, Healthcare facilities

CONTACT Dr Sharmin Haque Prima Email: sharminhaqueprimausa@gmail.com

BACKGROUND

Hospital waste is produced during healthcare activities, such as treating, diagnosing, and immunising humans or animals or doing study/research activities. The waste produced during healthcare activities carries a higher potential for infection and injury than any other type of waste. Inadequate and inappropriate knowledge of handling may have serious health consequences and a significant impact on the environment as well. Hospital waste poses a serious public health problem. The problem worsens with the increasing number of hospitals, clinics & diagnostic laboratories in Dhaka city. Inadequate and improper techniques may cause serious health hazards to the environmental population.

Non-hazardous waste does not pose unique handling problems to human health or the environment. In this study, non-hazardous waste is classified into two categories such as general waste and reusable waste. General waste includes food waste, paper waste, non-infectious materials, and waste originating from catering services and administrative establishments where, whereas reusable waste includes ampoules, empty syrup bottles, barrels, plungers, empty saline bags, sand sets without needles and nozzles that are not contaminated with blood or body fluid, etc. On the other hand, hazardous waste is responsible for spreading infections and epidemic diseases and should be handled with special care. This study also classified hazardous waste into two categories: clinical waste and sharp waste. Clinical waste includes blood bags, blood-contaminated saline/set, blood and body fluid-contaminated materials, body parts/organs, catheters, clothes used by AID Sandbarrier's

patients, drainage tubes, gauges, bandages, and cotton, surgical sponges, etc. On the other hand, sharp waste includes BP blades, broken glass, cover slip, infusion set, knives, needles, the nozzle of the syringe, scalpel blades, etc.

Source of health care waste: Government hospitals, Private hospitals, Nursing homes, Physician offices, Dentist offices, Dispensaries, Mortuaries, Blood banks and collection centres, Animal houses, Laboratories, and Research organisations.

LITERATURE REVIEW

The wastes generated during diagnosis, treatment, operation, immunisation, or research activities are termed as medical wastes. It is an ongoing problem for many countries and poses a serious public health problem. Due to the modernisation of medical services and the increased number of patients, healthcare institutions generate large amounts of medical waste. (M. Azage, 2013)

Approximately 75–95% of bio-medical wastes are non-hazardous, and the remaining 10– 25% are hazardous to humans or animals and detrimental to the environment. It is essential to realise that if both types are mixed together, all waste becomes harmful. Reports in the literature show that 80% of all medical wastes are mixed with general wastes. The World Health Organization (WHO) estimated that, in 2000, injections with contaminated syringes caused 21 million hepatitis B virus infections, 2 million hepatitis C virus infections, and 260,000 cases of human immunodeficiency virus (HIV) infections. Cases of staphylococcal bacteriemia and endocarditis were reported among cleaning

staff after needle injury.

Healthcare providers (HCPs) are at risk of occupational dangers as they perform their jobs in hospitals. Serious diseases may develop in HCPs, patients, and the general public. The highest occupational injury rates among all workers who may be exposed to healthcare waste were reported by cleaning personnel and waste handlers; the annual rate in the United States was 180 per 1000. Based on the types of waste and hospital categories, medical waste management (MWM) scenarios at hospitals in Bangladesh are not satisfactory.

There are approximately 1300 government hospitals with 43,000 beds, including public specialised hospitals, medical college hospitals (tertiary level), district hospitals (secondary level), and upazila (primary level) health complexes in Bangladesh. Many private hospitals and clinics also provide healthcare. The waste generation rates for infectious waste and sharps waste from government hospitals were 0.11 and 0.03 kg/bed/day, respectively. Most health facilities do not have adequate and effective systemic approaches to medical waste disposal. The medical wastes are mixed with the municipal wastes in the collecting bins at the roadside; some percentage are buried without any precautions or burned in the open. Polluting the environment with toxic substances is a serious public health problem in Bangladesh. Public awareness of healthcare waste has grown in recent years, especially with the emergence of acquired immunodeficiency syndrome (AIDS). (

M. Molla,2009)

In the past 10 years, healthcare waste generation has rapidly increased due to the increased number and size of healthcare facilities, medical services, and use of medical disposable products. The Ministry of Health and Family Welfare, Bangladesh, started to address the MWM as a priority program. HCPs have become part of the extensive MWM-related training program, and logistics, including different coloured bins, were supplied among the healthcare institutions; however, the situation is not yet satisfactory. Very few studies have reported on different isolated components of MWM in Bangladesh. One study reported on the health effects of medical practices on medical waste.

Another study identified the types and amounts of medical waste generated. There has been no published study among HCPs regarding awareness of knowledge and practices and possible barriers to proper MWM in Bangladesh. The WHO recommended raising awareness of medical waste risks and promoting safe and sound practices to improve the situation. Therefore, it was necessary to conduct this study to assess relevant knowledge and practices and identify possible barriers to proper MWM among HCPs. The association of knowledge and practices with background characteristics was also evaluated.

Recommended colour coding for hospital waste.

| Type of waste | Colour of the container and marking | Type of container |
|----------------|-------------------------------------|---|
| Clinical waste | Yellow | Strong, leak-proof plastic bag or container |
| Sharps waste | Red | Puncture proof container |
| Reusable waste | Black | Leak-proof plastic bag or container |
| General waste | Green | Plastic bag or container |



OBJECTIVE OF THE STUDY

The main objective of this study is to assess the level of medical waste management by hospitals in Dhaka city. The specific objectives of this study are to identify hazardous and non-hazardous hospital waste & find out problems associated with hospital waste. Other specific objectives are to assess the knowledge about the steps of hospital waste management and identify the socio-demographic characteristics of healthcare professionals in Dhaka, Bangladesh. Also, 4. prevent disease transmission by hospital waste from patient to patient and patient to health workers.

RESEARCH METHODOLOGY

The primary goal of this chapter is to concentrate on research methods that are appropriate for analysis. This study is aimed to assess the knowledge and practices regarding medical waste management (MWM) among healthcare providers (HCPs). This cross-sectional study was carried out to evaluate the level of medical waste management by hospitals in Dhaka. The target population is healthcare professionals from different private and government hospitals in Dhaka city.

These were male and female patients at different private and government hospitals in Dhaka. This approach employed a cross-sectional analysis with 379 patients in different private and government hospitals in Dhaka City, Bangladesh. This cross-sectional study was conducted from June to August 2023 among different level hospitals in Dhaka City, Bangladesh. One

tertiary-level hospital was selected purposively from Dhaka City. In the first stage, 3 out of 17 district (secondary level) hospitals were selected using a simple random sampling (SRS) method. In the second stage, we also selected 3 upazila (primary level) hospitals, 1 from each of the districts mentioned above, by applying the SRS. The sample of positive cases was collected using a systemic random sampling method. The following were the inclusion criteria for this study Participants had to be employed by the hospital under study—willingness to participate in the study after signing the consent form. Be literate in the English language.

The following healthcare workers were excluded from the study: All professional healthcare workers were not permanently employed by the hospital. Any staff members who were not willing to sign the consent to participate. The Data were collected using a self-administered open & closed questionnaire. The questionnaire was pretested to ascertain ease of understanding and to determine if it was worded to elicit all the materials of interest for this research study. Therefore, this process concerned assessing the questionnaire's content validity. Participants for the pretesting stage were drawn from the heads of Department at the study hospital, which included doctors & nurse practitioners. The pretesting of the questionnaire was conducted at the same hospital as the study. However, those in the pretesting phase were not allowed to participate in the study. Findings from this process showed that all respondents were satisfied & that the questionnaire was adequate for the purpose of the

study. The data will be collected and analysed using SPSS and presented in tables, pie charts, and Bar graphs. Computations included the index and percentage of waste management among healthcare professionals. The study was conducted in only a few selected government and non-government hospitals, clinics, and diagnostic centres in Dhaka City, mainly for HWM. Selected HCCs were considered and visited to quantify the hazardous and non-hazardous portion of HW generated in Dhaka. The rate of waste generation was known for a few selected HCCs. The seasonal variation of the waste generation rate could not be considered due to insufficient time. The radioactive wastes and radon gas emissions from HCCs are not considered here because no equipment was available to detect the presence and concentration of gas. From the findings of this study, we can assess the level of medical waste management by hospitals in Dhaka.

RESULTS

Descriptive statistics

Socio-demographic characteristics of the participants

Distribution of the participants by gender

Among 379 respondents, 273(72.1%) were male, and 106 (27.9%) were female.

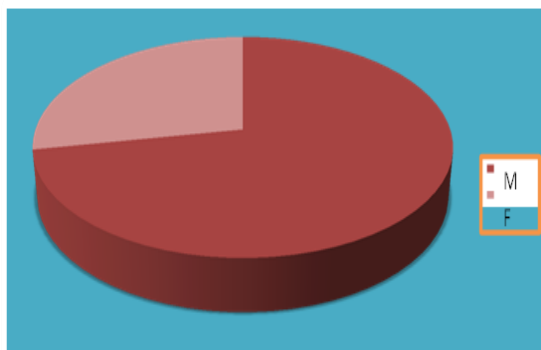


Figure 1: Distribution of the participants by gender

Distribution of the participants by age

Among 379 respondents, a maximum of 105 (27.7%) belong to 21 to 30 years, 100(26.4%) belong to 31 to 40 years, 93(24.5%) belong to 41 to 50 years, and 81(21.4%) belong to 51 to 60 years.

Table: 01: Distribution of the participants by age

| Age group | Number | Percentage % |
|-----------|--------|--------------|
| 21 to 30 | 105 | 27.7% |
| 31 to 40 | 100 | 26.4% |
| 41 to 50 | 93 | 24.5% |
| 51 to 60 | 81 | 21.4% |
| Total | 379 | 100% |

Distribution of the participants by Religion.

On asking about religion majority of them 221(58.3%) Muslim, 140(36.9%) Hindu, 10(2.6%) Christian and 8(2.1%) Buddhist.

Table 2: Religion.

| Religion | Number | Percentage % |
|-----------|--------|--------------|
| Muslim | 221 | 58.3% |
| Hindu | 140 | 36.9% |
| Christian | 10 | 2.6% |
| Buddhist | 8 | 2.1% |
| Total | 379 | 100% |

Distribution of the participants by Education Level

Below figure showed that among 379 respondent 37(9.8%) primary level, 40(10.6%) secondary level, 63(16.6%) higher secondary, 140(36.9%) Graduation and 99(26.1%) Diploma on education.

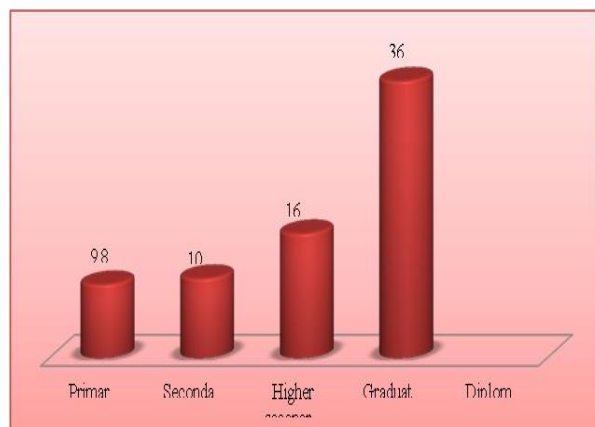


Figure 2: Educational Level

Distribution of the participants by Designation

On asking about their occupational designation majority of them 102(26.9%) Nurse, 71(18.7%) Doctor, 88(23.2%) Paramedic, 100(26.4%) cleaner and 18(4.7%) other staff.

Table 3: Designation

| Designation | Number | Percentage % |
|-------------|--------|--------------|
| Doctor | 71 | 18.7% |
| Nurse | 102 | 26.9% |
| Paramedic | 88 | 23.2% |
| Cleaner | 100 | 26.4% |
| Others | 18 | 4.7% |
| Total | 379 | 100% |

Distribution of the participants by Hospital Waste Disposal Policy

When asked about any Hospital Waste Disposal Policy In their, 341(89.9%) answered yes they have, and 38(10.1%) answered No.

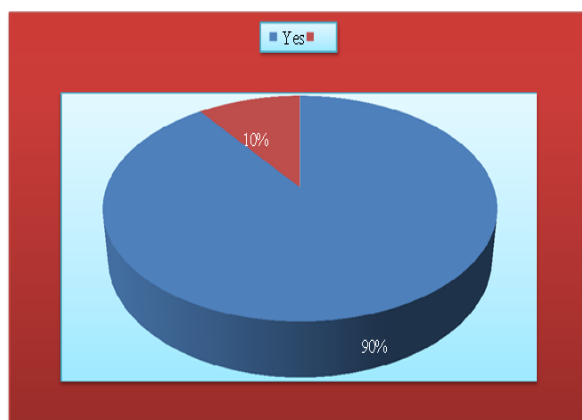


Figure 3: Hospital Waste Disposal Policy

Distribution of the participants by Following colour coding for hospital waste

On asking about the following colour coding for hospital waste, the majority of them, 322(84.9%), answered yes, and 57(15.1%) answered no.

Table 5: Follow colour coding for hospital waste

| Follow colour coding for hospital waste | Number | Percentage % |
|---|--------|--------------|
| Yes | 322 | 84.9% |
| No | 57 | 15.1% |
| Total | 379 | 100% |

Distribution of the participants by Disposal of plastic items

When asked about Used disposal plastic items are the disposal of 204(53.8%) answered yellow bags, 72(19%)red bags, 66(17.4%) black bags, and 37(9.8%) answered don't know.

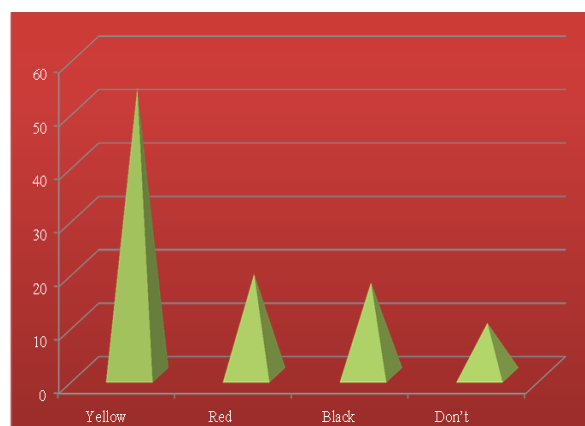


Figure 4: Disposal plastic items are disposed to dispose of.

Distribution of the participants by Solid waste recycling

On asking about solid waste recycling majority of them 205(54.8%) answered yes, 108(28.5%) No and 66(17.4%) not sure.

Table 7: Solid Waste Recycling

| Solid waste recycling | Number | Percentage % |
|-----------------------|--------|--------------|
| Yes | 205 | 54.8% |
| No | 108 | 28.5% |
| Not sure | 66 | 17.4% |
| Total | 379 | 100% |

Distribution of the participants by Waste management education programs

When asked about waste management education programs, the majority of them, 311(82.1%), answered yes, 40(0.6%) answered no, and 28(7.4%) had no response.

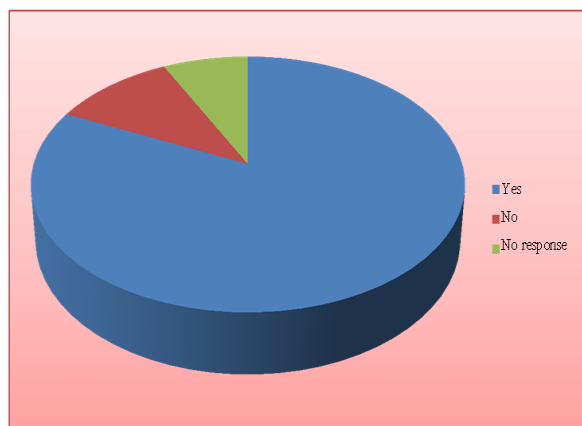


Figure 5: Waste management education programs

DISCUSSION

A descriptive cross-section study was done in Dhaka City, Bangladesh. The study population was health professionals at a Dhaka City, Bangladesh hospital. Through face-to-face interviews, three hundred seventy-nine sample

sizes were selected to assess the Knowledge, Attitude, and Practice regarding hospital waste management. The significant finding of this study in the area on discussed according to the analysis of the table & figures. The essential findings of the socio-demographic results of this study indicate that Among 379 respondents, 105 (27.7%) belong to 21 to 30 years, 100(26.4%) belong to 31 to 40 years, 93(24.5%) belong to 41 to 50 years and 81(21.4%) belong to 51 to 60 years. Similar The results revealed that most of the 344 respondents were female (87.2%), with the most common age range being 20–29 years old (36.9%). (International Committee of the Red Cross,2018)

The findings of among 379 respondent 37(9.8%) primary level, 40(10.6%) secondary level, 63(16.6%) higher secondary, 140(36.9%) Graduation and 99(26.1%) Diploma on education. Another study found that 39.6%were from higher secondary levels. (Jianlin Nie, 2016). Their occupational designation majority of them 102(26.9%) Nurse, 71(18.7%) Doctor, 88(23.2%) Paramedic, 100(26.4%) cleaner and 18(4.7%) other staff. In another study, the majority of doctors (83.3%), paramedics (80%), and medical students (66.7%) at King George’s Medical and Dental University, Lucknow, India, had good knowledge about methods of final waste disposal. When asked about Used disposal plastic items are the disposal of 204(53.8%) answered yellow bags, 72(19%)red bags, 66(17.4%) black bags, and 37(9.8%) answered don’t know.

A similar study showed that 36% of the clinics that participated in this study disposed of their medical waste in a public garbage container provided by the municipal waste transportation service. (Phuket Provincial Health Office,2017)

CONCLUSION AND RECOMMENDATION

Inadequate knowledge and poor practices were observed among HCPs in Bangladesh. Inadequate knowledge and poor practices were more prevalent among technologists and cleaning staff than medical doctors and nurses. Insufficient PPE, lack of instruments for final disposal, lack of staff, lack of appropriate guidelines, and lack of incinerators were identified as the top 5 possible barriers. Practice-based training regarding MWM.

Recommendation

- Improved waste management facility.
- Improved waste management knowledge for every staff.
- Organized waste management education program.

REFERENCES

- [1]. E. A. Udofia, J. N. Fobil, and G. Gulis, —Solid medical waste management in Africa,|| African Journal of Environmental Science and Technology, vol. 9, no. 3, pp. 244– 254, 2015.View at: Google Scholar
- [2.] B. Mugabi, S. Hattingh, and S. C. Chima, —Assessing knowledge, attitudes, and practices of healthcare workers regarding medical waste management at a tertiary hospital in Botswana: a cross-sectional quantitative study,|| Nigerian Journal of Clinical Practice, vol. 21, pp. 1627–1638, 2018.View at: Google Scholar
- [3]. B. Nagaraju, G. Padmavathi, D. Puranik, M. Shantharaj, and S. Sampulatha, —A study to assess the knowledge and practice on bio-medical waste management among the health care providers working in PHCs of Bagepalli Taluk with the view to prepare informational booklet,|| International Journal of Medicine and Biomedical Research, vol. 2, no. 1, pp. 28– 35, 2013.View at: Publisher Site | Google Scholar
- [4]. M. A. Sarker, M. Harun-Or-Rashid, T. Hirose, et al., —Evaluation of knowledge, practices, and possible barriers among healthcare providers regarding medical waste management in Dhaka, Bangladesh,|| Medical Science Monitor: International Medical Journal of Experimental and Clinical Research, vol. 20, no. 20, pp. 2590–2597, 2014.View at: Publisher Site | Google Scholar
- [5]. I. M. Ismail, A. G. Kulkarni, S. V. Kamble, S. A. Borker, R. Rekha, and M. Amruth,—Knowledge, attitude, and practice about bio-medical waste management among personnel of a tertiary health care institute in Dakshina

- Kannada, Karnataka, Al Ameen Journal of Medical Sciences, vol. 6, no. 4, pp. 376–380, 2013. View at: Google Scholar
- [6]. World Health Organization (WHO), Waste Related to Health Care. Aide-Memoire No.253, World Health Organization (WHO), Geneva, Switzerland, 2015, <https://www.who.int/en/news-room/factsheets/detail/health-care-waste>.
- [7]. J. D. Ntirenganya, Knowledge, Attitudes and Practices of Health Professionals on the Management of Hospital Waste, Saint Joseph University, Goma, Congo, 2010, <https://www.memoireonline.com/11/13/7979/Connaissances-attitudes-et-pratiques-des-professionnels-de-sante-sur-la-gestion-des-dechets-hosp.html>.
- [8]. Ministry of Public Health (MINSANTE), Sectoral Strategy for Health. Yaoundé, Republic of Cameroon, Ministry of Public Health (MINSANTE), Nonthaburi, Thailand, 2016, http://www.nationalplanningcycles.org/sites/default/files/planning_cycle_%20repositorio/cameroon/sss_officiel_2001-2015.pdf.
- [9]. Ministry of Public Health (MINSANTE), National Plan of Sanitary Development. Yaoundé: Republic of Cameroon, Ministry of Public Health (MINSANTE), Nonthaburi, Thailand, 2014, https://www.uhc2030.org/fileadmin/uploads/ihp/Documents/Country_Pages/Cameroon/Cameroon_National_Health_Plan_2011-2015_French.pdf.
- [10]. D. SCHWARTZ, Statistical Methods for Physicians and Biologists, Flammarion Médecins Sciences, Paris, France, 1969.
- [11]. A. Younes, E. B. Mohamed, H. Mohamed, K. Abderrazzak, O. T. Ahmed, and S. H. Ahami,—Waste management of infectious risk care activities in diffuse environments: medical analysis laboratories, in the Gharb region of Morocco, International Journal of Science and Research, vol. 13, pp. 163–172, 2015. View at: Google Scholar
- [12]. M. Ndiaye, L. El Metghari, M. M. Soumah, and M. L. Sow, —Gestion des déchets biomédicaux au sein de cinq structures hospitalières de Dakar, Sénégal, Bulletin de la Société de pathologie exotique, vol. 105, no. 4, pp. 296–304, 2012. View at: Publisher Site | Google Scholar
- [13]. J. Ndie, —Study of the management of hospital structures in the reference health structures of the North-Cameroon region, European Scientific Journal, vol. 2, pp. 362–364, 2015. View at: Google Scholar
- [14]. J. Mouankie, B. Abena, and A. DiakoukaDiambou, —Management of biomedical waste in Brazzaville, Congo, European Scientific Journal, vol. 11, no. 23, pp. 317–324, 2015. View at: Google Scholar
- [15]. J. Saizonou, E. M. Ouendo, V. Agueh, E.

- Tokplonou, and M. Makoutodé, —Evaluation of the quality of solid biomedical waste management in Klouekane and Toviklin-Lalo health zones in Benin,|| International Journal of Travel Medicine and Global Health, vol. 1, pp. 1– 11, 2014.View at: Google Scholar
- [16]. C. Perrot, Management of Waste from Pharmacy and Laboratory Activities in Health Facilities, National School of Public Health (ENSP), Rennes, Portugal,2011, <https://documentation.ehesp.fr/memoires/2001/phisp/perrot.pdf>.
- [17]. J. B. Mokoko, B. I. Atipo, J. F. Mimiesse, P. J. Iloukou, and R. Takale, —Management of hospital waste and biomedical equipment of the University Hospital in Brazzaville,|| Health and Medical Sciences, vol. 19, pp. 1–5, 2017.View at: Google Scholar
- [18]. V. Sengodan, —Segregation of biomedical waste in a South Indian tertiary care hospital, || Journal of Natural Science, Biology and Medicine, vol. 5, no. 2, pp. 378–382, 2014.View at: Publisher Site | Google Scholar