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Impact of Bio-Medical Waste Management on Corona Virus in India: A Critical Analysis

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ABSTRACT

The Supreme court of India through several judgements has propounded Right to clean environment as a Fundamental Right. Environmental pollution is a menace to our society, one of the major contributors to this hazardous pool is the pharmaceutical industry. The rise in the population, patients, healthcare facilities and extensive research and production of medicines has resulted to an exponential increase in the volume of the waste. The lack of management and implementation of the law has made the situation even worse. For effective management of the waste it is important that there is government support, finance, infrastructure, well equipped healthcare facilities, educated healthcare workers and strong regulatory bodies.

In the ensuing discussions in the paper, the authors will elaborate upon the legal framework of the Bio-medical Waste Management Rules and its implementations amidst the Corona Virus outbreak in India. Further the authors would highlight the response of the judiciary and the significant international convention pertaining to the issue at hand. The paper argues that there has been a lack of implementation of the law and, that the bio-medical waste needs to be managed appropriately, especially, now during the Corona Virus Pandemic.

I. INTRODUCTION

Waste management is of paramount significance for the protection of human life and the environment. Any kind of failure to appropriately address this matter leads to serious irreversible consequences. Indian Pharmaceutical industry is one of the world's largest and produces around twenty percent of the generic drugs that are exported worldwide. It has over the years transported drugs to two hundred countries and is seen as a pharmaceutical giant.³In lieu of this, bio-medical and Health care Industry in India therefore acts as a backbone to the country. However, with such exponential growth comes hazards associated, and with it, comes the need for laws to regulate it. Over the years, with the growth in the Pharmaceutical Industry,

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³Indian Brand Equity Foundation, *Indian Pharmaceuticals Industry Report*, 2020.

India has recognised the need for good laws relating to bio-medical waste management, however, its implementation is still far from ideal. India would most likely generate 77.5 tonnes of medical waste per day by 2022 considering the current estimated level of waste upon 550.9 tons per day growing at compound annual growth and the waste management market in India would expectedly reach US\$ 13.62 billion by 2025 according to ASSOCHAM- Velocity MR Report.⁴ On 31st January 2020, India witnessed its first coronavirus case and in less than three-months we have crossed more than 10,000 cases. In such circumstances, it becomes a matter of concern to manage the bio-medical waste produced in our country amidst Covid-19 pandemic. If this situation is not curbed at its initial stage, the repercussions of this may lead to a consequence worse than anticipated.

II. LEGAL ASPECT OF THE BIO-MEDICAL WASTE MANAGEMENT

With the exponential growth of the healthcare facilities in the country the waste which is it generated is also sizable and needs to be monitored and regulated. The Ministry of Environment, Forest and Climate Change (herein after referred as “*MoEF & CC*”) have laid down certain set of rules under the powers vested in them U/Ss. 6,8 & 25 of the Environment (Protection) Act, 1986. The aforementioned Act empowers the Central Government to make rules to fulfil the purpose of this Act by the means of a notification in the official Gazette⁵. The Central Government’s order to regulate the bio-medical waste management system in the country and to efficiently manage the waste has been laid down in the Bio-Medical Waste (Management and Handling) Rules, 2016 (herein thereafter referred as “*BMW Rules, 2016*”). BMW Rule, 2016 and Revised Guidelines for Common Bio-medical Waste Treatment and Disposal Facilities (herein thereafter referred as “*CBWTF*”) are the two most important regulations laid down by the MoEF & CC for the regulation and implementation of bio-medical waste management. Bio-Medical Waste Management Rules were originally framed in 1998 and till date four amendments have been made to these rules, 2000, 2003 and the latest one in the year 2016. Rule 3(f) of the BMW Rule, 2016 defines “bio-medical waste” refers to

“any waste which is generated during the diagnosis, treatment or immunization of human beings or animals or research activities pertaining thereto or in the production or testing of biological or in health camps, including the categories mentioned in Schedule I appended to these rules”⁶

These BMW Rules of 2016 are applicable to “all persons who generate, collect, receive, store,

⁴ Bio Voice, *India’s medical waste growing at 7% annually: ASSOCHAM Velocity study. 2018.*

⁵ Section 25, Environment (Protection) Act, No. 29 of 1986, (India).

⁶ Rule 3(f), Bio-Medical Waste (Management and Handling) Rules, 2016, (India).

transport, treat, dispose, or handle bio medical waste in any form”⁷ but shall not be applicable to any persons or organizations who fall within the scope of Rule 2(2) of the BMW Rule, 2016. The Rules also lay down the duties which are to be performed by the Occupier, Operator and the Prescribed Authority in order to manage the disposal of the waste. An occupier⁸ is person who has an administrative control over the facility which generates bio-medical waste, the rules prescribe certain duties which he needs to fulfil in his capacity as an occupier. He needs to make sure that the facility is safe for storage and the waste generated is handled in a manner that no harm is caused to the human health, he needs to pre-treat any kind of bio-medical waste generated in accordance with the WHO and NACO guidelines so that the waste is safely sent to the treating facility.⁹ The operator is a person who owns and controls the Common Bio-medical Waste Treatment Facility.¹⁰ The 2016 amendment to the rules specifically laid the down the duties of the operator. Primarily the duties of the operator are to ensure that the waste is safely collected from the occupier by trained personnel and further transported to the facility without any harm. The treatment which is collected from the occupier should be segregated and disposed according to the standard prescribed by health care facilities and common bio-medical waste treatment facility.¹¹

The schedule I of the Rules state the categories according to which these bio-medical wastes are to be segregated. There are four colour codes which categorize the waste according to the treatment which is essential to dispose it. The entire waste is disposed of at the waste treatment facility which is governed by the BMW Rules, 2016 and Bio-medical Waste Treatment and Disposal Facilities Guidelines. The BMW Rules of 2016 provides that a health care facility (hereafter referred as “HCF”) should be restricted from disposing the waste on the premise if there is a CBWTF within seventy-five kilometres, these rules have eased the blockage in creating CBWTF and by giving the responsibility of land allocation to the state or UT governments.¹² There are specific guidelines mentioned which elucidates upon the applicability, location criteria, land requirement, treatment requirement, infrastructure set up and monitoring and operating systems required in order to setup and run the CBWTF.

III. INTERNATIONAL CONVENTIONS AND TREATIES SURROUNDING WASTE MANAGEMENT

There are several international agreements and conventions which govern the management of

⁷ Rule 2(1), Bio-Medical Waste Management and Handling) Rules, 2016, (India).

⁸ Rule 3(m), Bio-Medical Waste Management and Handling) Rules, 2016, (India).

⁹ Rule 4, Bio-Medical Waste Management and Handling) Rules, 2016, (India).

¹⁰ Rule 2(n), Bio-Medical Waste Management and Handling) Rules, 2016, (India).

¹¹ Rule 7, Bio-Medical Waste Management and Handling) Rules, 2016, (India).

¹² Revised Guidelines for Common Bio-Medical Waste Treatment Facilities by The Central Pollution Control Board, 2016.

bio-medical waste, the three most essential agreements are, Basel Convention on Hazardous Waste, Stockholm Convention on Persistent Organic Pollutants and Minamata Convention on Mercury and India is a signatory to all the three agreements. The Basel Convention is the most comprehensive treaty which nearly includes all the major countries, the objective of this convention is to protect the human health and environment from the ill effects of hazardous waste.¹³ The primary objective of the Stockholm convention is to protect the human health and the environment from Persistent Organic Pollutants (POPs).¹⁴ Persistent Organic Pollutants are toxic substances which are collected in the fatty tissues of the living organisms, POPs are generally formed by medical waste incinerators and other combustion processes.¹⁵ The 2006 guidelines on best available techniques and provisional guidance on best environmental practices includes “reduction, segregation, resource recovery and recycling, training, and proper collection and transport”¹⁶ of waste which have been ratified by India. Minamata Convention on Mercury was ratified by India in June 2018 with its primary objective being, “to protect the human health and the environment from anthropogenic emissions and releases of mercury”¹⁷. This treaty mainly focuses on the exclusion certain medical appliances and equipment which have high level of mercury content.¹⁸

IV. OVERALL IMPLEMENTATION BIO-MEDICAL WASTE MANAGEMENT RULES IN INDIA

The BMW Rules came into force in 1998 and despite of having set stringent guidelines and rules on how to manage and dispose waste many regions of the country have failed to implement these rules effectively. The primary reason behind this lethargic approach towards the implementation of these rules is because the entire legal framework has been reduced to mere paperwork and there is lack of concern awareness and motivation for the appropriate management of bio-medical waste. Across India there are 2,38,170 Healthcare Facilities which produce nearly 557 tons of bio-medical waste on a daily basis, 198 CBWTFs and 9,830

¹³ Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Mar. 22, 1989, 1673 U.N.T.S. 57.

¹⁴ Stockholm Convention on Persistent Organic Pollutants, May 22, 2001, 2256 U.N.T.S. 119.

¹⁵ Priya Datta, Gursimran Kaur Mohi, and Jagdish Chander, *Bio-medical waste management in India: Critical appraisal*, NATIONAL CENTER FOR BIOTECHNOLOGY INFORMATION (Apr. 04, 2020, 16:00 PM), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5784295/>.

¹⁶ Guidelines on best available techniques and provisional guidance on best environmental practices relevant to Article 5 and Annex C of the Stockholm Convention on Persistent Organic Pollutants, Dec 2004, <http://dev.dioksyny.pl/wp-content/uploads/Draft-BAT-BEP-Dec-2004.pdf>.

¹⁷ Minamata Convention on Mercury, Oct 10, 2013, 54669 U.N.T.S. 27.

¹⁸ David Lennett, Richard Gutierrez, *Linking science and policy to support the implementation of the Minamata Convention on Mercury*, SPRINGER LINK, (Apr. 04, 2020, 17:20 PM), <https://link.springer.com/article/10.1007/s13280-017-1003-x>.

Healthcare facilities having the capability and technology to dispose and treat the waste.¹⁹ These two facilities combined can only process 518 tons per-day which is deficit to a produce of total 557 tons of bio-medical waste per-day.²⁰

Many states across the country have witnessed failure in management due to their non-compliance of BMW Rules and Guidelines. According to a recent study of the Centre for Science and Environment, in 2017, Jharkhand disposed 2,201 kilograms of untreated waste which is nearly forty percent of the total waste produced.²¹ It is mandated that all the hospitals and healthcare facilities should comply by the standards and procedures set by the BMW Rules, 2016, however, while fourteen out of nineteen hospitals did not comply with the rules, majority were not even aware about the mandatory preparation of report within twenty-four hours of the accident as prescribed under the 2016 rules.²² Hyderabad is one of the most prominent cities for the production of pharmaceutical waste in the country, this large production is having ill effects on the environment and human health. The lakes are foaming and shrinking by the week which results in the emission of toxic gas and chemicals, thereby turning the water bodies unfit for domestic use.²³ Maharashtra on the contrary has efficient waste management system and has adhered to the BMW Rules, 2016 and set up healthcare facilities and CBWTFs to dispose and treat the waste which is produced. According to the Maharashtra Pollution Control Board Report, nearly 62,418 kilograms of waste was produced, and 62,134 kilograms was disposed and treated in the year 2018-19.²⁴

V. JUDICIAL RESPONSE

The Judiciary has always been a great staunch advocate to the environment for many decades with the National Green Tribunal passing several judgements with regard to the implementation of the bio-medical waste management law. In *Kasala Malla Reddy and Others vs State of Andhra Pradesh & Others*²⁵ the apex Court directed the State Government and officials to form an expert committee and study the water bodies of the Manjira River basin and Musi River Basin and record the hazardous pollution caused by Pharmaceutical industry

¹⁹Ministry of Environment, Forest and Climate Change, *Annual Report*, § 89, 2018-19.

²⁰*Id.*

²¹Centre for Science and Environment, *over 40 per cent of bio-medical waste generated in Jharkhand goes untreated, seriously endangering public health: CSE's new study*, (Apr. 10, 2020, 01:48 AM), <https://www.cseindia.org/over-40-per-cent-of-bio-medical-waste-generated-in-jharkhand-goes-untreated-seriously-endangering-public-health-cse-6847>.

²²*Id.*

²³ Changing Market Foundation, *Hyderabad's pharmaceutical pollution crisis: Heavy metal and solvent contamination at factories in a major Indian drug manufacturing hub*, § 15, M2018.

²⁴Maharashtra Pollution Control Board, *Annual Report*, § 66, 2018-19.

²⁵*Kasala Malla Reddy and Others vs State of Andhra Pradesh & Others*, (2017) S.C.C. OnLine NGT 1914 (India).

leading to rise in the AMR level.²⁶ The following directions were in lieu to the rise in the Anti-Microbial Resistance (AMR) which was endangering the health of the villagers who were drawing water from these water bodies for domestic use.

In a more recent judgement, The National Green Tribunal directed the CPCB and UPPCB to form a monitoring committee, prepare reports and take corrective actions to control the water pollution in the rivers.²⁷ The judgement was with regard to the increasing contamination of water bodies and ground water in the district of Gorakhpur due to improper management of pharmaceutical and other hazardous wastes. The final order of the judgment is still *sub-judice* but the court has taken appropriate measures and directed the concerned authorities to take pollution control measures.

Managing bio-medical waste is a job which requires knowledge and awareness not only from the level of the occupier but also from the level of the operator. In order to effectively implement these laws, we require additional stringent laws that impose penalties/punishment for non-compliance and improper management of handling waste at both levels. To correct these negligent actions which may endanger human lives, workers should be trained thoroughly through annual or semi-annual training programs. Stringent legal actions should be taken against defaulter who fail to comply by these rule and guidelines. Further, SPCB should ensure that these healthcare facilities and CBWTFs are made available in the rural areas as well.

Therefore, it can be deduced that, India, over the years has been unable to regulate the bio-medical waste appropriately and implement the laws adequately. Failed implementation would naturally have certain consequences on the environment and human health. The primary concern which needs to be addressed with uttermost priority is the rise of the Anti-Microbial Resistance (AMR) level due to pharmaceutical pollution resulting in the development of “superbugs”. The production of antibiotics leads to a residue which is released into the environment, this water is released into farms for irrigation and for domestic use. The rise in AMR level diminishes the effectiveness of the antibiotic on the human body and eventually makes the antibiotic completely ineffective against any virus or bacteria. As of 2014 nearly 700,00 people had lost their life due to these AMR infections globally.²⁸ The only way to curb the infections and flatten the graph is through proper implementation and awareness.

VI. LAWS IN RELATION TO CORONA VIRUS

The study outlined above through this paper has elucidated the major challenges in bio-medical

²⁶*Id.*

²⁷Meera Shukla v. Municipal Corporation, Gorakhpur and Others, (2019) S.C.C. OnLine NGT 866 (India).

²⁸ Indian Drug Manufacturer’s Association, *Indian APIs and Formulation for Global Healthcare*, § 28, 2018-19.

waste management in the current health care scenario prevalent in India. The lack of speed in data availability, underreporting of waste generated and handling capacity, non-compliance of BMW Rules, underdevelopment of CBWTF's in certain states/UT's, all this leads to inadequate waste management which further causes environmental pollution, multiplication of vectors such as insects and rodents which thereby causes transmission of cholera, hepatitis, AIDS, through contamination in syringes, needles etc. With India having access to only 198 Common Bio-Medical Waste Treatment Facilities (CBMWTFs) and 225 captive incinerators, it becomes an important issue of concern if India would be able to manage its rising quantities of medical waste with the coronavirus pandemic over its head. Most countries around the globe have witnessed an increase in medical waste generated between 6-10% during the peak of its outbreak.

On January 2020, the Ministry of Health and Family Welfare had issued Guidelines on Infection Prevention and Control in Health Care Facilities²⁹ in which it had identified novel coronavirus as a suspected pathogen under its IPC precautions pending confirmation of diagnosis³⁰. It enunciated management of bio-medical waste with respect to waste segregation at the point of generation, treatment and waste disposal, bio-medical waste handlers, maintenance of records and training.

In order to curb the issue to Covid19 pandemic, The Central Pollution Control Board had issued guidelines³¹ dated 18th March 2020 to address the issue of generated waste during the diagnostic, treatments, management and quarantine of coronavirus suspected/confirmed patients. These guidelines were to be followed by all the stakeholders of Central and State government initiatives including that of the isolation wards, quarantine centres, ULB's laboratories, hospitals and sample collection centres in addition to the existing practices of administering bio-medical waste and general solid waste under the BMW Rules, 2016 and Solid Waste Management Rules, 2016 respectively. These guidelines were formulated based upon the current knowledge and existing management of infectious waste generated in hospitals at the time of treating contagious diseases like HIV and H1N1 etc.

An interim guidance was issued by World Health Organisation on Water, Sanitation, Hygiene and Waste Management under which it urged the health care facilities to administer waste produced during the care of Covid-19 patients for its safe disposal and treatment or both, off-

²⁹ Ministry of Health and Family Welfare, Guidelines on Infection Prevention and Control in Health Care Facilities, 2020.

³⁰ *Id.* At 186.

³¹ Guidelines for Handling, Treatment and disposal of waste generated during treatment/ diagnosis/Quarantine of Covid-19 patients, 2020.

site and on-site³². Further, another interim guideline was issued by WHO on Infection prevention and control during health care when COVID-19 is suspected, which called upon applying standard precautions for all patients and advised medical waste to be managed with safe routine procedures.³³

The World Health Organisation, however, did not allocate any exclusive comprehensive guidelines for bio-medical waste management. It placed its reliance on guidance that was released by WHO on Safe Management of wastes from Health Care Facilities, in 2017.³⁴ With regard to coronavirus, there were no committed guidelines for the pharmaceutical waste management of infectious disease and had only provided for standard precautions and routine procedures.

Health Care Institutions across the country have issued policies on bio-medical waste management for waste generated from the patients of Covid-19 ward/OPD. Such policies have been drafted as per the principal rules of BMW, 2016 and amendment rules 2018, 2019, the National guidelines IPC, CDC and WHO guidelines. Such institutions are required to categorise and segregate the waste based on its nature for its collection, treatment, processing and disposal accordingly. Soiled waste such as liquid and discarded items and metallic implants shall be collected separately and be made properly disinfected by chemical treatment using sodium hypochlorite. Other forms, such as human/animal anatomical waste and Cytotoxic drug vials shall be incinerated by Common Bio-medical Waste Treatment and Disposal Facility (CMBWTF). In addition to this, the management of bio-medical waste devices, articles generated at the time of diagnosis, treatment and immunization of Covid-19 patients shall be done in accordance with standard procedures and rules.

The Safdarjung Hospital (SJH) located in Delhi, for instance, had issued policies for the governance of bio-medical waste generated during the management Corona Virus patients.³⁵ The BMW unit of SJH and VMMC has formulated category wise treatment by allocating colour coded bags by providing separate treatment and disposal options of each category. In

³²Interim Guidance, *World Health Organisation on Water, Sanitation, Hygiene and Waste Management*, WORLD HEALTH ORGANISATION (Apr. 06, 2020, 07:15 PM), <https://www.who.int/publications-detail/water-sanitation-hygiene-and-waste-management-for-covid-19>.

³³Interim Guidance, *Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected*, WORLD HEALTH ORGANISATION (Apr. 10, 2020, 04:15 PM), [https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-\(ncov\)-infection-is-suspected-20200125](https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-(ncov)-infection-is-suspected-20200125).

³⁴WHO, *Safe management of wastes from health-care activities: a summary*, WORLD HEALTH ORGANISATION, (Apr. 8, 2020, 02:35 PM), <https://apps.who.int/iris/bitstream/handle/10665/259491/WHO-FWC-WSH-17.05-eng.pdf;jsessionid=9514095D07361AB31EB658A3EB05E677?sequence=1>?

³⁵SJH, *SJH Policy on Bio-medical waste management for BMW from patients in novel Corona Virus Ward/OPD*, BMW UNIT SJH AND VMCC, NCDC, (Apr. 9, 2020, 02:05 PM) <https://ncdc.gov.in/WriteReadData/1892s/9390326671580949311.pdf>.

addition, the bags used for storing and transporting bio-medical waste have been made available in compliance as per Plastic Management Rules, 2016 till the time Bureau of Indian standards are published. They have mandated chemical disinfection on a daily basis, collecting of generated waste twice in a day and provided for bio medical waste not to be left untreated for more than 48 hours.

VII. CORONA VIRUS: IMPLEMENTATION OF LAWS AND SITUATION IN INDIA

Amidst the Coronavirus pandemic, people across the country were advised to stay at home quarantined for fourteen days on suspicion that they would be potential carriers of the coronavirus disease. According to the guidelines, the bio-medical waste generated from such homes were to be collected in yellow bags and the same had to be handed over to the authorised waste collector ULB's engaged by CBWTF to be picked up either directly from such quarantined homes or an identified collection point³⁶. While some states have been able to set up a system to collect the medical waste, other states such as Rajasthan, West Bengal among few have been lagging behind. Around seven states lack CBWTF facilities. The CPCB had categorised masks and gloves as 'domestic hazardous waste', however, much of the bio-medical waste is being given the same treatment as solid domestic waste instead of being disposed at CBWTF's. It was observed by the authorities that when the vehicle entered the residential area for collection, most residents raised concerns that it would lead to the spread of germs although most of the process is done in a scientific manner. While the responsibility of the state pollution board is to collect data related to bio-medical waste, the health and the local-self-government are required to share a list of coronavirus related facilities and the data of waste generated. Although the guidelines released by the CPCB look good on paper, however, experts have been doubtful about its implementation on ground level. It must be considered that bio-medical waste generated at homes are no different and may contain the same virus and have a potential threat. One of the reasons for poor implementation is lack of training among the personnel. Instead of creating a separate team by the ULB's for the purpose of collection who further have to be trained, the task should have been handled directly by the CBWTF's.

The guidelines by CPCB on medical waste lays down duties of CBWTF's wherein the operator shall ensure the regular sanitization of workers who are involved in the process of collecting and handling bio-medical waste and shall also be provided with adequate PPE's, three layered

³⁶ Rule (c), Guidelines for Handling, Treatment and disposal of waste generated during treatment/diagnosis/Quarantine of Covid-19 patients, 2020.

masks, splash proof gowns, gum boots, nitrile gloves and safety goggles³⁷. A recent study that was conducted found that coronavirus normally stays on cardboard for about 24 hours and in plastic and stainless steel for about 72 hours.³⁸ This raises a concern for the sanitation of the workers deployed in the informal sector. Around 1.5-4 million workers in our country are involved in the work of waste collection, recycling and sorting. If such an issue is neglected and their safety measures are not looked upon, their health would be at risk. The guidelines also provide for CBWTF's to work for extra hours and provision for PPE kits for staff and vehicles. It is critical for CBMWTF's to conduct appropriate monitoring, review and verification during the high-risk scenario.

Some cities in the country amidst the outbreak witnessed a steep decline in the production of bio-medical waste. Nagpur for instance has reported around 900kg less than its average production of 3,136kg of bio medical waste pre-coronavirus outbreak. The result behind this is because most of the private doctors having their clinic or even bedded hospitals have shut their clinic amidst lockdown in lieu of coming in contact with virus due to lack of safety equipment's. In an interview with the State President of Indian Medical Association (IMA), he said, "of the total covid-19 bio medical waste that is generated, 75% of it are medical kits", he further said that "IMA would not be able to run long due to lack of funds".

Cities in West Bengal have been facing serious challenges in disposing the bio-medical waste generated. According to a news report³⁹, until the first week of April, the agencies of bio-medical waste in the state claimed that they had not been engaged by the municipalities regarding the collection of waste from quarantine homes, the civil body of the state attributed this delay to 'work burden'. It is important to understand that such form of waste generated if is not collected and incinerated adequately would lead to high risk of spreading of the infectious disease. However, Gurgaon on the other end has been successful in putting up dedicated incinerators to dispose bio-medical as well as solid waste from multi-speciality hospitals.

VIII. SUGGESTIONS

Leading scientists and organisations across the country have anticipated that if serious measures are not taken to curb the widespread, then a country with such dense population such

³⁷ Rule(d)(ii)&(iii), Guidelines for Handling, Treatment and disposal of waste generated during treatment/diagnosis/Quarantine of Covid-19 patients, 2020.

³⁸Dr. Van Doremalen, Mr. Bushmaker, and Mr. Morris, *Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1*, THE NEW ENGLAND JOURNAL OF MEDICINE, (Mar 31, 2020, 10:38 AM) 2020 <https://www.nejm.org/doi/full/10.1056/NEJMc2004973>

³⁹JAYANTA BASU, *COVID-19: DISPOSING BIO-MEDICAL WASTE BENGAL'S CHALLENGE AT HAND, DOWN TO EARTH*, (MAR 31, 2020, 17:38 PM), [HTTPS://WWW.DOWNTOEARTH.ORG.IN/NEWS/HEALTH/COVID-19-DISPOSING-BIO-MEDICAL-WASTE-BENGAL S-CHALLENGE-AT-HAND-70112](https://www.downtoearth.org.in/news/health/covid-19-disposing-bio-medical-waste-bengal-s-challenge-at-hand-70112).

as ours might become the worst affected country, with over 60% of the population being infected with the virus. Taken this into consideration, one of the potential sources of this infection could be society's indiscriminate disposal of waste into separate categories and mixing bio-medical waste into solid waste. The worst affected victims of this would be municipal workers and the ragpickers, most of them not being directly engaged by the CBWTF's. This calls for an urgent need to create a halt in the chain of transmission by providing such workers with safety kits and to educate them on how to handle the household waste amidst this pandemic. There shall be no handling of waste with bare hands. Moreover, the general public shall ensure that the waste generated is segregated at its source. Scientifically, gloves and masks shall be incinerated, however, this might not be possible at households and for this reason, guidelines must be followed, and such waste must be disposed in separate yellow bags, especially at the time of current outbreak.

All scientific and medical information must be circulated among the citizens for them to be able to make informed choices. All medical institutions shall formulate separate policies following the guidelines and rules circulated by the health bodies. Over the years, plastics like PET, HDPE have played a major role in providing essential supplies during catastrophes and disease pandemics even easier by providing high levels of safety. We must dispose properly gloves, sanitiser bottles, tissue paper so that such items are collected adequately and are treated and recycled. Sanitiser bottles are made up of PET plastic and is globally one of highest recyclable plastic, must be disposed in the right manner to ensure recycling.

IX. CONCLUSION

To live in a clean and safe environment is every person's fundamental right, the management of bio-medical waste is a pursuit which cannot be achieved on a single level. Our objective can only be achieved when all the levels in the system share equal commitment in following rules and guidelines. The implementation of the BMW Rules, 2016 is only achievable if there is consensus between the Healthcare workers, HFCs and CBWTFs supported by the government and strong legislation. Although the apex Court of India has delivered several judgments, yet the implementation and management in India is not effective and fulfilling the set standards. Amidst the Corona Virus the pharmaceutical waste produced has increased enormously, therefore, it is more than necessary that the rules and guidelines are followed throughout the nation. Battling this issue has entangled complex humanitarian and environmental challenges which requires immediate action, failure to take appropriate measures can lead to grave consequences which would leave a scar on the not just India but the entire world.