EFFECTS OF BIOMEDICAL WASTE ON ENVIRONMENT DURING COVID – 19: AN ANALYSIS

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ABSTRACT

The global outbreak of corona virus disease 2019 (COVID-19) is affecting every part of human lives, including the physical world. The measures taken to control the spread of the virus and the slowdown of economic activities have significant effects on the environment. Therefore, this study intends to explore the positive and negative environmental impacts of the COVID-19 pandemic, by reviewing the available scientific literatures. This study indicates that, the pandemic situation significantly improves air quality in different cities across the world, reduces GHGs emission, lessens water pollution and noise, and reduces the pressure on the tourist destinations, which may assist with the restoration of the ecological system. In addition, there are also some negative consequences of COVID-19, such as increase of medical waste, haphazard use and disposal of disinfectants, mask, and gloves; and burden of untreated wastes continuously endangering the environment. It seems that, economic activities will return soon after the pandemic, and the situation might change. Hence, this study also outlines possible ways to achieve long-term environmental benefits. It is expected that the proper implementation of the proposed strategies might be helpful for the global environmental sustainability.

Keywords: Environmental assessment, Environmental pollution, Environmental management, Environmental sustainability, COVID-19, Public health, Lockdown, GHGs emission, Biomedical waste.

1. Introduction

Bio-medical waste (BMW) differ from general municipal waste as it poses various health hazards, Bio-medical waste management rules 2016 and the amendment rules 2018 are the latest guidelines from the ministry of environment forest & claimants change to regulate the handling of Bio-medical waste (BMW) activities in the country.

Due to the flowed Bio-medical waste Managements (BMWM) systems and lack of resources India faces several consequences during the Covid – 19.

Untreated and improperly managed Bio-medical waste (BMW) is a positional sources of infection.

The diligent handling and management of BMW can prevent the occurrence of hospital-acquired infection and lower the rates of disease transmission. In addition, the untreated or the rudimentary handling of BMW creates a nuisance and decreases patient satisfaction.

According to the data published by the central pollution control board (CPCB) in the year 2018, the total amount of BMW generated in India is 517 tonnes/day in the year 2016 and around 501 tonnes/day in the year 2015, out of which around 4–5% remains untreated. The annual report 2018/2019 released by CPCB showed the generation of 557 tonnes/day BMW in 2017, out of which 517/day was treated. The country has a total of 238,170 healthcare facilities, out of which 87,267 are bedded while the remaining 151,208 are non-bedded healthcare facilities (HCFs) generating BMW. There are 198 approved common biomedical waste disposal facilities (CBMWFs) in the country and 28 are under construction.

2. Ground-level process for handling and managing the BMW in India

Biomedical waste is not handled like a municipal waste. The central pollution control board (CPCB) is the apex body to monitor the country's BMW management activities under the ministry of environment, forest, and climate change. There are separate state pollution control boards in each state to monitor and regulate the BMW activities within the state and report the findings to the CPCB. The country has a stringent policy of onsite segregation of the generated BMW and storing, transporting, and disposing of them in adherence to the biomedical waste rules framed by the ministry under the Government of India. It is mandatory for all the small clinics, diagnostics, laboratories, nursing houses, hospitals and other healthcare institutions to

comply with these guidelines. Previously, the country had ten different categories of waste for segregation. Later, it was amended into four classes for easy segregation. Infected or potentially infected waste is labeled as yellow, apparently non-infected and recyclable fall in the red category, sharps and small metallic items comes under the white category while waste consisting of glass is segregated into the blue category. Segregated waste is stored in a well-ventilated area and the stored waste is carried to the disposal facility (commonly known as common biomedical waste disposal facilities) for further treatment and disposal. The treatment of solid waste at the site of generation or storage is prohibited according to the updated guidelines. The waste should be transported in a designated closed vehicle that is equipped with the global positioning system tracker. The BMW in the CBMWFs is then treated, sterilized, and sent for recycling, incineration, or landfilling based on the waste category. The qualitative process and quantitative data on the generated and disposed off BMW should be accurately documented and reported to the state pollution control board. Violating these guidelines by healthcare facilities and disposal facilities will subject them to penalties. Despite stringent rules and liability, the country reports a high degree of non-adherence to these guidelines. According to the annual report, 2018/19 published by the CPCB, 23,942 HCFs violated the BMW rules 2016, and 18,210 HCFs were issued a warning for their violation. The report shows the massive amount of BMW generation per day and around 13% of HCFs have violated BMW rules, which show the poor biomedical handling and management in India.

3. Existing problems of BMW and crisis during COVID-19 pandemic

The most populous cities like Delhi, Mumbai, Bangalore, Chennai, Hyderabad, etc. are the most affected cities by COVID-19. According to data published by NDTV on September 18, 2020, the country is generating a considerable amount (Above 100 tonnes/day) of COVID-19 related biomedical waste in the country. Maharashtra contributes for approximately 17% of total COVID-19 related **BMW**. Now the national daily waste generation is reaching around 850 tonnes/day.

4. Environmental effects of COVID-19

The global disruption caused by the COVID-19 has brought about several effects on the environment and climate. Due to movement restriction and a significant slowdown of social and economic activities, air quality has improved in many cities with a reduction in water pollution in different parts of the world. Besides, increased use of PPE (e.g., face mask, hand

gloves etc.), their haphazard disposal, and generation of a huge amount of hospital waste has negative impacts on the environment. Both positive and negative environmental impacts of COVID-19.

4.1 Positive environmental effects of COVID-19 pandemic

4.1.1 Reduction of air pollution and GHGs emission

As industries, transportation and companies have closed down, it has brought a sudden drop of greenhouse gases (GHGs) emissions. Compared with this time of last year, levels of air pollution in Ney York has reduced by nearly 50% because of measures taken to control the virus (Henriques, 2020). It was estimated that nearly 50% reduction of N_2O and CO occurred due to the shutdown of heavy industries in China (Caine, 2020). Also, emission of NO_2 is one of the key indicators of global economic activities, which indicates a sign of reduction in many countries (e.g., US, Canada, China, India, Italy, Brazil etc.) due to the recent shut down (Biswal et al., 2020; Ghosh, 2020; Saadat et al., 2020; Somani et al., 2020). Usually, NO_2 is emitted from the burning of fossil fuels, 80% of which comes from motor vehicle exhaust (USEPA, 2016). It is reported that NO_2 causes acid rain with the interaction of O_2 and H_2O, and several respiratory diseases suffered by humans (USEPA, 2016). The European Environmental Agency (EEA) predicted that, because of the COVID-19 lockdown, NO_2 emission dropped from 30-60% in many European cities including Barcelona, Madrid, Milan, Rome and Paris (EEA, 2020). In the US NO_2 declined 25.5% during the COVID-19 period compared to previous years.

4.1.2 Reduction of Water pollution

Water pollution is a common phenomenon of a developing country like India, and Bangladesh, where domestic and industrial wastes are dumped into rivers without treatment (Islam and Azam, 2015; Islam and Huda, 2016; Bodrud-Doza et al., 2020; Yunus et al., 2020). During the lockdown period, the major industrial sources of pollution have shrunk or completely stopped, which helped to reduce the pollution load (Yunus et al., 2020). For instance, the river Ganga and Yamuna have reached a significant level of purity due to the absence of industrial pollution on the days of lockdown in India. It is found that, among the 36 real-time monitoring stations of river Ganga, water from 27 stations met the permissible limit (Singhal and Matto, 2020). This improvement of water quality at Haridwar and Rishikesh was ascribed to the sudden drop

of the number of visitors and 500% reduction of sewage and industrial effluents (Singhal and Matto, 2020; Somani et al., 2020).

4.1.3 Reduction of Noise Pollution

Noise pollution is the elevated levels of sound, generated from different human activities (e.g., machines, vehicles, construction work), which may lead to adverse effects in human and other living organisms (Goines and Hagler, 2007; Zambrano-Monserrate et al., 2020). Usually, noise negatively effects on physiological health, along with cardiovascular disorders, hypertension, and sleep shortness of human (Kerns et al., 2018). It is reported that, globally around 360 million people are prone to hearing loss due to noise pollution (Sims, 2020). World Health Organization predicted that in Europe alone, over 100 million people are exposed to high noise levels, above the recommended limit (WHO, 2012). Moreover, anthropogenic noise pollution has adverse impacts on wildlife through the changing balance in predator and prey detection and avoidance. Unwanted noise also negatively effects on the invertebrates, that help to control environmental processes which are vital for the balance of the ecosystem

4.1.4 Ecological restoration and assimilation of tourist spots

Over the past few years, tourism sector has witnessed a remarkable growth because of technological advancements and transport networks; which contribute significantly to global gross domestic product (GDP) (Lenzen et al., 2018). It is estimated that the tourism industry is responsible for 8% of global GHGs emission (Lenzen et al., 2018). However, the places of natural beauty (e.g., beaches, islands, national park, mountains, desert and mangroves) are usually attracting the tourists, and make a huge harsh. To facilitate and accommodate them, lots of hotels, motel, restaurant, bar and market are built, which consume lots of energy and other natural resources

4.2 Negative environmental effects

4.2.1 Increase of biomedical waste generation

Since the outbreak of COVID-19, medical waste generation is increased globally, which is a major threat to public health and environment. For sample collection of the suspected COVID-19 patients, diagnosis, treatment of huge number of patients, and disinfection purpose lots of infectious and biomedical wastes are generated from hospitals.

4.2.2 Safety equipment use and haphazard disposal

To protect from the viral infection, presently peoples are using face mask, hand gloves and other safety equipment, which increase the amount of healthcare waste. It is reported that, in USA, trash amount has been increasing due to increased PPE use at the domestic level (Calma, 2020). Since the outbreak of COVID-19, the production and use of plastic based PPE is increased worldwide.

4.2.3 Municipal solid waste generation, and reduction of recycling

Increase of municipal waste (both organic and inorganic) generation has direct and indirect effects on environment like air, water and soil pollution (Islam et al., 2016). Due to the pandemic, quarantine policies established in many countries have led to an increase in the demand of online shopping for home delivery, which ultimately increase the amount of household wastes from shipped package materials (Somani et al., 2020; Zambrano-Monserrate et al., 2020). However, waste recycling is an effective way to prevent pollution, save energy, and conserve natural resources.

4.2.4 Other effects on the environment

Recently, huge amount of disinfectants is applied into roads, commercial, and residential areas to exterminate SARS-CoV-2 virus. Such extensive use of disinfectants may kill non-targeted beneficial species, which may create ecological imbalance (**Islam and Bhuiyan, 2016**). Moreover, SARS-CoV-2 virus was detected in the COVID-19 patient's faeces and also from municipal wastewater in many countries including Australia, India, Sweden, Netherlands and USA

8. Conclusion

Biomedical waste is a serious health concern. Untreated biomedical waste serves as a potential source of pathogens. Literature has reported more than 40 species of harmful micro-organism to possess the potential to transmit and cause human illness. The etiological agent of the pandemic is highly contagious and rapidly transfers from one person to another via various routes. Due to its high transmission rate, the risk of getting infected is persistently high. Realizing the threat of disease, state and central pollution control boards in association with AIIMS New Delhi have framed various guidelines. These guidelines are focused on the

prevention of healthcare personals and workers involved in its handling and management. This update has enabled the preparation of policies for the temporary centers and has emphasized the roles and responsibilities of the concerned persons and authorities'. Strict compliance with these newly framed guidelines will make the management of the exponential increase in BMW easier and safer for the environment and community.

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