



SOLID WASTE MANAGEMENT THROUGHOUT PANDEMIC COVID-19: CHALLENGES AND SOLUTIONS

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ABSTRACT

Wuhan City became the epicentre of the extremely infectious novel corona virus at the starting of January 2020. In terms of socioeconomic-environmental problems, the COVID-19 pandemic has produced a global emergency situation. Such a crisis has altered waste generation and disposal in both qualitative and quantitative ways, posing real challenges to policymakers in making decisions that will ensure environmental sustainability. People of all ages are disrupting their daily routines, which has resulted in a change in the waste produced by medical facilities and quarantine centres. The mandatory use of personal protective equipment such as masks, gloves, sanitizers, and other similar products by frontline staff in the medical sector, banks, daily need shops, waste management industries, and elsewhere, as well as the use of masks by any average person stepping out, has distorted the waste generation trend in a different direction. The current study attempts to reflect the difficulties that the current waste management system faces in combating massive waste generation. India ranks second in the world in terms of COVID positive cases, resulting in a massive increase in biomedical waste production. As a result, the current report has attempted to illustrate and address all of the emerging issues that have arisen as a result of the continuing global pandemic, as well as the importance of doing so.

Keywords: COVID-19 pandemic, Challenges, Solid waste management, Biomedical wastes.

INTRODUCTION

In urban India, solid waste management (SWM) has been one of the most important development problems. Owing to microbial decomposition, climate conditions, refuse characteristics, and land-filling activities, several studies have shown that improper waste disposal creates toxic gases and leachates. The COVID-19 pandemic has already wreaked havoc on the waste industry. As the pandemic was spreading and many countries were implementing lockdowns, municipal waste operators and public authorities were forced to quickly adapt their waste management systems and procedures to the situation. COVID-19 is a highly transmissible and pathogenic virus caused by the SARS-CoV-2 coronavirus (Hoque *et al.*, 2020; Rahman *et al.*, 2020; Kumari and Shukla, 2020). It

showed severe effects on environment and society (Verma and Prakash, 2020a; Roy and Chaube, 2021). There is no way of knowing when this deadly pandemic will stop, and there are no safe therapeutic or preventive medicines available. The use of masks and other personal protective devices is thought to be one of the most viable ways to protect people from the virus. Medical waste (MW) associated with COVID-19 presents a new problem for developing countries with insufficient waste management systems.

Following the advent of COVID-19, the city of Wuhan in China saw a more than fivefold rise in MW generation (Islam *et al.*, 2020; Si and Li, 2021). Manila, Kuala Lumpur, Hanoi, Bangkok, and some UK cities all saw

similar rises, generating 154 to 280 tons more MW per day than before the pandemic (ADB, 2020; COVID-19 waste survey results, 2020). Large number of wastes including e-wastes and medical wastes created by health-care activities have the potential to damage the global environment as well as human, domestic, and wild animal health if it is not properly managed (Stuart, 2019; Verma and Prakash, 2020b). MW-related diseases claim the lives of approximately 5.2 million people per year, including 4 million children (The Daily Star, 2020). According to a recent World Health Organization (WHO) survey, inappropriate waste management causes 25.0 percent of diseases in developing countries (Trivedi *et al.*, 2020). COVID-19 disease presents a danger to the spread of this extremely infectious disease due to improper waste management (Das *et al.*, 2020).

CHALLENGES

Prior to the COVID-19 pandemic, the world was already grappling with problems in the waste management market, with over two billion people lacking access to waste collection and over three billion lacking access to waste disposal. As a consequence, the advent of the COVID-19 pandemic, as well as the subsequent social distancing steps, exacerbates an already overburdened field. Throughout the COVID-19 pandemic, mostly countries is confronted with a number of difficult issues that must be resolved immediately. These difficulties include the following:

1. Since the volume of domestic hazardous waste (DHW), which includes gloves, masks, and other products, is rising rapidly, there is a problem with collecting the waste separately.
2. Staff and sanitary workers are not given adequate training to deal with the general waste that is created during COVID-19.
3. The tracking, inspection, and verification systems in towns and villages are inadequate.
4. Waste treatment plant managers and employees are still in grave danger. Daily waste handling instruction for the operators is also a difficult problem.
5. The collection staff's chances of being contaminated may be increased if PPEs and disinfectants are not provided on a regular basis or if they are not provided at all.
6. Owing to a shortage of door-to-door collection personnel in many parts of the world, one-point collection has become the norm, raising the risk of contamination as residents congregate at a single venue.
7. Separate vehicles for transporting COVID-19 waste from homes/quarantine centres to the CBWTF, as well as chemicals to clean them. There's a risk the virus will

spread if these vehicles are used to gather MSW without being disinfected.

8. The implementation of the CPCB guidelines and SBM advisory at the local level among residents and other waste-handling personnel.
9. According to SWM law, public information about the segregation of dry and wet waste, as well as domestic hazardous waste, cannot be given in weeks or months.
10. Infection will spread among sanitary workers if PPEs are not used and removed properly.
11. Maintaining social isolation in compliance with the standards at both collection centres and treatment plants.
12. Since the virus may be present in wastewater discharged from health-care facilities, operators and personnel working at wastewater treatment plants are at a large risk of infection.
13. Personnel involved in sludge management or wastewater treatment handling are often at risk of being polluted.
14. Site conditions in certain parts of the world necessitate manual loading or unloading of waste, raising the risk of pollution.

POSSIBLE SOLUTIONS

The sudden cessation of industrial and everyday operations impacted product production, resulting in the layoff of many workers, and shifted waste generation and collection patterns. Patients are overcrowding isolation facilities and hospitals, resulting in a vast volume of infectious waste. From health care to domestic levels, the demand for PPE kits, masks, hand sanitizers, gloves, and other items has increased at an unexpected pace, resulting in massive waste generation. Several countries have taken precautions to prevent the virus from spreading.

Therefore, the possible solutions which may be the:

1. Domestic hazardous materials should be disposed in yellow bags provided by ULBs and should not be mixed with other household waste during storage and collection by the collection authority.
2. Before using, the yellow bag containing the DHW should be thoroughly tested to ensure that it does not leak, and it should be kept out of the reach of children and pets.
3. Masks, gloves, and other personal protective equipment (PPE) produced during home quarantine should be stored in paper bags for a minimum of 72 hours before being disposed of as general waste or handed over to a sanitary worker.
4. A request to the Urban Local Bodies affiliated with solid waste management for an identifying

arrangement for the collection of DHW (both wet and dry waste created as home quarantine as SBM considers these waste as biomedical waste), and this waste should not be dumped near the locality or water source, or in open areas.

5. A separate team should be formed to collect COVID19 waste.
6. Just hand over this waste to an approved collector at the curb, if a collection system exists; if not, deposition centres for yellow bags have been created.
7. If an alternative arrangement is possible, contact the CBMWTF operator and have your waste delivered to your door.
8. People who generate DHW as a result of the home quarantine should contact ULB officials if they have any problems handling the waste.
9. The yellow bags and other services should be given by ULBs to the people who run Quarantine Camp and homecare providers.
10. Sanitary personnel should wear personal protective equipment (PPE) and sanitise it on a regular basis, and they should not touch anything with their bare hands (fleet/waste buckets, even plastics, cardboard, and steel, etc.).
11. Doctors and other health professionals can sanitize the equipment they use to treat patients.
12. Staff in the waste processing plant should be supplied with appropriate PPE and removal procedures.
13. People and sanitation workers should keep a safe distance of at least 6 feet between them.
14. If you have COVID19 symptoms, stay away from other people and work, and notify the appropriate people or boss at work.
15. The health care provider and sanitary worker should remove their PPEs according to procedure and thoroughly wash their hands, mouth, eyes, nose, and other body parts.
16. Vehicles used to process this waste should be sanitized with sodium hypochlorite on a regular basis.
17. After leaving the house, wash your hands and face thoroughly, and leave your shoes outside.
18. Before and after commissioning the work of workers employed in hospitals, group work, or waste disposal units, there should be a regular check-up.
19. A monitoring and analysis team should be established to oversee waste collection, processing, and care.
20. Health-care centres in India should be expanded, especially for COVID19.
21. If a patient is ambulatory, they can continue to use the nearby services. If the patient used a bedpan, solidify the excreta with super absorbent polymer gel granules before disposing of it as hospital waste.
22. The COVID19 waste bags should have a barcoding scheme that is correctly enforced.
23. Liquid chemical waste produced by quarantined person should not be deposited directly into the general wastewater; instead, it should be treated in an appropriate facility.
24. The CPCB recommendations under COVID19 should be strictly followed by local governments.
25. Community and social medicines should be emphasized and used properly (Balwan et al., 2021).
26. Before placing waste containers out for collection, the waste generator demands that they wash their hands. To further minimize visibility, sanitize or clean the handles and lids.
27. Do not place tissues, paper towels, wipes, masks, latex gloves, or any other sanitary or cleaning materials used to protect yourself from the Coronavirus in recycling carts or bins.
28. Before recycling, empty, clean, and dry your bottles, cans, and other containers.
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(https://swana.org/docs/default-source/resources-documents/c19_guidelines-resident.pdf and <https://nidm.gov.in/covid19/PDF/covid19/research/16.pdf>)

CONCLUSION

The pandemic is predicted to last until 2030, according to the current scenario. As a result, a long-term solid waste management strategy is needed. The most important prerequisite is for people to be aware of how to deal with the current situation wisely. People must be concerned about the welfare of the frontline workers, as waste management is not solely the responsibility of the collector. As a result, the instruction to reduce waste generation is given. Countries have introduced strict and versatile waste disposal policies to prevent virus transmission through solid waste generated by households, self-isolated COVID patients, and hospitals as a result of changing conditions influencing waste collection and disposal.

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