

# Review Paper on Negative Impact of Plastic on Environment during Covid -19

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**Abstract-** Since the beginning of the first cases of the new coronavirus, opinions and laws on the use of plastic materials have been questioned around the world. Their importance in the manufacture of hospital devices and personal protective equipment (PPE) is unquestionable, as they contribute largely to the reduction of the virus spread, helping health systems from all edges of the world and most importantly, saving lives. However, the same material that is a protector, becomes a polluter when inadequately disposed of in the environment, generating or worsening socio-environmental problems, such as pollution of water bodies by plastic. A critical overview of the role of plastic during the COVID-19 pandemic is provided in this paper. A future panorama is attempted to be outlined. The real possibility of the virus spread from the use of plastic is discussed, as well as the recycling of plastic during the pandemic, correlating its use with problems that it may cause.

**Keywords-** COVID-19; plastic; virus spread; recycling; public health; environmental problems.

## I. INTRODUCTION

During the pandemic, personal protective equipment (PPE) has driven increased plastic pollution. In response to high PPE demand among the general public, health care workers, and service workers, single-use face mask production in China soared to 116 million per day in February, about 12 times the usual quantity

(2). The World Health Organization has requested a 40% escalation of disposable PPE production

(3). If the global population adheres to a standard of one disposable face mask per day after lockdowns end, the pandemic could result in a monthly global consumption and waste of 129 billion face masks and 65 billion gloves

(4). Hospitals in Wuhan, the center of the COVID-19 outbreak, produced more than 240 tons of single-use plastic-based medical waste (such as disposable face masks, gloves, and gowns) per day at the peak of the pandemic, 6 times more than the daily average before the pandemic occurred

(5). If the increases observed in Wuhan hold true elsewhere, the United States could generate an entire year's worth of medical waste in 2 months

(6). This global health crisis puts extra pressure on regular waste management practices, leading to inappropriate management strategies, including mobile incineration, direct landfills, and local burnings

(7). Improper disposal of just 1% of face masks translates to more than 10 million items, weighing 30,000 to 40,000 kg

(8). Waterlogged COVID-19-related plastic has been observed on beaches and in water

(9), potentially aggravating the challenge of curtailing microplastics.

## II. PROPOSED WORK

Need for a proper use and disposal of personal protective equipment:

- To prevent virus transmission, the use of PPE, such as medical masks and gloves, by medical staff and health workers, and later on by ordinary citizens became essential.
- The demand for PPE increased significantly worldwide. The increased demand and indiscriminate use of PPE by ordinary citizens quickly became controversial due to the lack of correct handling and disposal, and the shortage of this material in Healthcare facilities, where such material is mandatory and of utmost importance .

PPE used by ordinary citizens should be disposed of as mixed wastes (not recyclables) in sealed and leak-proof garbage bags, that will likely follow to incineration facilities (preferable), or daily landfilling.

- recycling centres , thus prioritising both incineration and landfilling. Such a reduction in waste recycling is divergent from the goals of circular economy and sustainable development, and even contributing to plastic waste pollution.
- Improvement of municipal waste-management

During epidemic and pandemic events, it is of utmost importance to gather reliable information about quantity and type of waste (i.e., accurate characterisation data), and how

much material can be reused or recycled (stimulated by proper decontamination) to then determine what indeed goes for incineration or landfill.

- Waste management is especially important during the pandemic due to the increased risk of pathogen transmission and increased domestic waste production.
- Likewise, it should be mandatory and reinforced the use of PPE for workers related to waste management.
- Therefore, municipalities responsible for waste collection and treatment should create guidelines and procedures to apply during pandemics regarding waste reduction recommendations, protective measures, collection frequency, and end-of-life.

Disinfection of medical wastes and PPE allowing for safe recycling:

- During pandemic events, all medical waste and PPE should be carefully monitored by specialised personnel to guarantee health safety. Disinfection technology, including UV, ozone or bioengineering approaches, can offer a sustainable strategy to treat waste and wastewaters
- For high volumes of infectious medical waste (>10 t/day) the incineration continues to be the best option as it completely kills pathogens due to the high-temperature applied (over 800 °C). If the amount of medical waste is not too high (<10 t/day), chemical disinfection (i.e., use of chemical disinfectants) or physical disinfection (microwave or high temperature steam) might be an option .
- Alongside, decontamination of PPE, including face shields, surgical masks and N95 respirators, could be useful to maintain adequate supplies, and to promote its extended, reuse and recyclability options. Moreover, recycling technologies of non-woven textiles, from which most PPE is made, is still very limited due to the lack of technology and their composition (e.g. combination of materials as composites) .
- Implementation of sustainable safety measures to guarantee the delivery goods and ensure services provisioning Reusable grocery bags (preferable plastic or fabric) should be encouraged but highlighting the need for implementing mitigation strategies to ensure the complete elimination of the pathogenic agent. Such mitigations strategies could involve proper hand hygiene and decontamination bath of the reusable bags (i.e., soaked in liquid soap and water temperature > 40 °C).

Remediation measures to mitigate the potential adverse effects of plastic pollution due to pandemic scenarios:

- The increasing danger of plastic waste (particularly SUP and PPE) due to COVID-19 is already an unquestionable reality, which calls for remediation/mitigation strategies. However, such knowledge is based on in-situ visual census.
- For instance, clean-up technologies such as automated waste collection boats/ floaters proved to be efficient for plastics removal from surface waters (e.g., the Interceptor, launched by The Ocean Cleanup; the Bubble barrier and the Waternet).
- Wastewater treatments seem to eliminate a considerable percentage of plastic debris, but there is still a need of complementary treatments when considering particles of smaller size such as microplastics .
- With this purpose, and in addition to the membrane treatments and filtrations already applied, the application of cleaner technologies, such as the application of membrane processes, regenerative filters systems or precipitation with magnetic nanoparticles, and application of inorganic–organic hybrid silica gels – organosilanes, have been developed and proved to be successful .
- In soil systems, the application of synthetic, or improved natural microbial community for plastic bioremediation processes seems to be a low-cost, highly efficient and green approach.

Create synergisms between academia and government to increase public awareness (including stakeholders) towards a sustainable production, use and disposal of plastics:

- It is imperative to rethink our attitudes towards plastic usage, by promoting sustainable behaviours, breaking old habits and adopting new ones. To achieve this, it is important to stimulate scientific research and solutions for an effective communicative strategy as decision-makers struggle to find relevant communication channels and tonalities to increase environmental awareness of the public and persuade people to change their lifestyle, consumption patterns and behaviour.
- Raising awareness over plastic waste and contamination should not be interrupted nor reversed, as it required long-term efforts to results in behavioural changes, which may be loss due to disruption or contradictory information.
- In addition, knowledge communication forums using science communication and citizen science through public participatory approaches should be stimulated .

Plastic waste will not be the only that need to be addressed when health-related issues are overcome, but all the consequences (indirect effects) that will arise from our shift in

priorities without thinking in a long-run. It is of utmost importance to recognise that Human Health is connected and dependent on the health of our environment and ecosystems, and if humanity does not respect such connection, and continuing thinking on “today” instead of “today in prole of a sustainable future”, there will not exist a future.

Likewise, governors should seek to implement a more efficient plastic waste management system for plastic waste recovery; accompanied by restrict laws and regulation for production, use, and consumption of plastic products (including incentives for recycling and redesigning).

### III. LITERATURE REVIEW

- **Lauer et al., 2020:** Ortiz-Prado et al., 2020) With the coronavirus disease 2019 (COVID-19), a pandemic of global concern caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the entire world has come to a halt witnessing a lifestyle that is becoming the new normal. SARS-CoV-2 is known to be easily transmissible from one person to another (sustaining the median incubation period of approximately 5.1 days), infecting on an average of 2.4–3.3 people from just one confirmed case.
- **Kahlert and Bening, 2020 :**In addition to the imposition of nationwide lockdown, social distancing, restriction on traveling and public gathering, frequent usage of hand sanitizers along with wearing of mostly plastic-based personal protective equipment (PPEs), viz. face masks, gloves for common citizens to protective medical suits, aprons, gowns, face shields, surgical masks, and other PPEs for frontline health workers as precautionary measures have been adopted to avoid virus contamination to fight the spread of COVID-19.
- **Mol and Caldas, 2020:**Mismanagement and littering of plastic waste may not only pose a risk of virus transmission but also create pollution in terrestrial and marine ecosystems.
- **Aragaw TA (2020):**Surgical face masks as a potential source for microplastic pollution in the COVID-19 scenario.
- **Bupe G Mwanza, Charles Mbohwa :**Waste recycling is a livelihood for the marginalized society in the developing economies and it is not surprising to find recycling of municipal solid waste (MSW) been carried out. Plastic waste is a waste type in MSW yet a number of challenges still exist in managing this waste type
- **Ying Zheng, Ernest K Yanful, Amarjeet S Bassi:** This review looks at the technological advancement made in the development of more easily biodegradable plastics

and the biodegradation of conventional plastics by microorganisms.

- **Wai Chin LI, HF Tse, Lincoln Fok:**This review article summarises the sources, occurrence, fate and effects of plastic waste in the marine environment. Due to its resistance to degradation, most plastic debris will persist in the environment for centuries and may be transported far from its source, including great distances out to sea.
- **JiříJaromírKlemeš, Yee Van Fan, Peng Jiang :**The assessment of recyclability, reprocessing and environmental burden of disposal phases are also needed. This presented work tends to contribute to the discussion of what recommendations should be developed to the industry and business to minimize the environmental impacts.
- **Melissa L Van Rensburg, L NkomoS'phumelele, Timothy Dube :** Plastic pollution in the ocean and in coastal environments is a growing concern which requires immediate attention. Single-use plastic is polluting coastal environments the world over, and this study focused on the issue within the context of Durban, South Africa. Advocating for behavioral changes from society remains a daunting task that requires an understanding of consumer perceptions towards single-use of plastics.

### IV. INITIATIVES

- Plastics indeed offers a panoply of characteristics and properties that greatly improved our quality of life, thus being difficult to imagine a plastic-free economy and life. Yet, we must seek sustainable options.
- Biobased plastics might be a solution at an early stage, but it is important to scale up in innovation to ensure their environmental friendliness and their integration in the circular economy.
- Likewise, such process must be accompanied by extended producer responsibility, with the producer (distributors and sellers) internalising the cost of management of waste (recycling and disposal) of their products. Plastics should, therefore, remain in the top of the political agenda in Europe and across the world, not only to minimise plastic leakage and pollution but to promote a circular economy, and to ensure sustainable growth, underlining both green and blue- economies.

### V. CONCLUSION

As a result, we need to aware of the burden carrying our environment, we need to demand for recycled plastic material has dropped, the profit margins of recycling have decreased, and the environmental footprint of plastics has increased . We need urgent and coordinated commitment to

circular economy approaches, including recycling practices and strict policies against plastic pollution. Companies should continue efforts to curtail virgin plastic use and increase plastic recycling to live up to their corporate social and environmental responsibilities. Without a concerted effort to protect the environment during and after the pandemic, we are unlikely to meet the United Nations' Sustainable Development Goals.

## VI. ACKNOWLEDGEMENT

We would like to express our special thanks of gratitude to our professor “Ali Mohammad Zeeshan” for their able guidance and support in completing our project

We would also like to extend our gratitude to the head of department Prof.I.A.K.Syed sir and principal “Dr.M.BDiagwane” sir for providing us with all facility that was required

Date:

1\6\2021

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