

Plastic Waste Management in the times of Pandemic: A Review

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Abstract:- The pandemic has changed the normal lifestyle of people with increased dependence on non-recyclable or disposable items such as plastic-lined masks, gloves, hand sanitizer bottles and other personal protective equipment. It has become a fact that such single use plastic items have proven to be a lifesaver in order to fight against COVID-19 in every sector globally. But the rate at which its consumption is increasing seems to be unmatched with the rate of its management thereby creating a risk of bigger health hazards in the near future. So, there is a need to make sure that the waste management systems are well supported to deal with the current as well future plastic waste in India. This paper looks into the various challenges in the plastic waste management practices due to COVID-19 situation and it also suggests some possible ways to deal with the issue.

Keywords: Covid-19, Plastic waste, changing policies

INTRODUCTION

Plastics have a pivotal status in the present era. It has transformed every individual's everyday life through its varied application in the form of packaging films, wrapping materials, shopping and garbage bags, containers, clothing, toys, industrial products, building materials and more. Many of its inbuilt properties (e.g., availability, lightweight) are the reason that has led to its penetration into several industrial sectors, such as packaging, healthcare, fisheries and agriculture [1]. The benefits of plastics has always been very well known in the human society, but the problems associated with its management were never anticipated at the time when its consumption kept increasing every day with time. This has eventually raised the various environmental concerns associated with it [2]. A developing country like India is responsible for generating 9.46 million tons of plastic waste annually, out of which 40 percent of it remains uncollected, as per the recently published study by Un-Plastic Collective (UPC), a voluntary multi-stakeholder initiative co-founded by the Confederation of Indian Industry (CII), United Nations Environment Programme (UNEP) and WWF.

The huge quantity of unmanaged plastic waste leaks into the environment causing significant economic and ecological

damage. It fills up the landfill sites and is also responsible for polluting the natural environment in its original form or in the form of micro-plastic. Several initiatives like implementation of taxes and ban on single-use plastics have been taken at international, national and local level in the past to curb plastic pollution [4].

In the current time of pandemic, the new hygienic way of life is leading to a reversal of many such rules, regulations as well as initiatives taken in the past which were earlier in place to reduce the use of plastics, specifically the single-use ones. Single-use plastics and COVID-19 have become inseparable. There has been a sudden increase in the demand for plastic products in the form of personal protective equipment to protect the public in general, and specifically the patients and health and service workers. Dependence on packaged meals and home delivered groceries has further increased the load of plastic waste on the environment. The most commonly used test for confirmation of COVID-19 is the RT-PCR diagnostic test that generates a considerable amount of plastic residue. However, this residue generation is inevitable as it is important for the early detection of virus in the body.

The positive side of the several restrictions on public gatherings and lockdowns during the pandemic have also brought down the demand for certain single-use plastic items like plastic cups and other disposables which are difficult to recycle and are banned almost everywhere. Change in the waste disposal practices like separating the waste in order to protect the spread of infection has also been adopted by many people at various places. On the other hand, there has been a widespread use of protective gear throughout the country and its improper disposal has created a threat for the natural environment [3]. According to the World Health Organization, the used personal protective equipment are frequently pathogen-contaminated, and ought to be discarded in an appropriate waste container after use. Waste collection, meanwhile, has become more challenging due to social-distancing rules and the health risk to the waste collectors. Less amount of

household waste is getting channeled into the right direction which may further affect the supply chain of recycling industries [5].

This paper highlights the various challenges of plastic waste management in the context to the current COVID-19 crisis. It tries to explain the various factors which have led to the increase in plastic usage during the pandemic. Further, it tries to explore possible solutions to overcome the existing challenges of the current crisis in order to prevent any further damage to human health and the environment as well.

INCREASED CONSUMPTION OF PLASTICS DUE TO PANDEMIC

In spite of witnessing the positive environmental implications of the nationwide lockdowns due to COVID-19 pandemic, e.g., cleaner rivers and skies, the same is not the case with respect to plastic waste management. The pandemic has greatly altered the waste generation patterns, creating various problems majorly among the policymakers and the workers involved in the sanitation sector.

Increase in Packaging waste - According to a study conducted by United Nations Conference on Trade and Development (UNCTAD), due to total lockdowns and the closure of eating places around the world, the demand for home delivery services of food and groceries has increased which in turn has led to an increase in the generation of common packaging plastic waste like Polypropylene (PP), Low-Density Polyethylene (LDPE), High-Density Polyethylene (HDPE), Polyethylene Terephthalate (PET) and Polystyrene (PS) [6].

Increase in plastics used in personal protective equipment - Health regulatory bodies worldwide like Indian Council of Medical Research (ICMR), World Health Organization (WHO) and United States Centers for Disease Control and Prevention (CDC) have laid down strict protocols to be followed by healthcare workers. They specifically consist of using Personal Protective Equipment (PPE) like masks (respirators), gloves, coveralls, face shields, safety goggles, foot cover and hair cover which are all made from plastics. According to a study on "Dealing With Medical Plastic Waste: An Aftermath of COVID-19", a variety of plastics like low density polyethylene (LDPE), polypropylene (PP), polycarbonate (PC), polyvinyl chloride (PVC) and polyethylene terephthalate (PET) and are used to make various PPEs [10]. Due to the COVID-19 pandemic, wearing masks in public areas has become mandatory. The disposable face masks (single use face masks) are also produced from polymers. They consist of three layers - an inner layer (soft fibers), a middle layer (melt-blown filter), and an outer layer (nonwoven fibers, which are water-resistant and usually colored) [7]. During plasma transfusion from COVID recovered patients, the membranes used are made up of polyethersulfone(PES), polymethylmethacrylate (PMMA) or even Polypropylene(PP), which is again a type of plastic[11].

THE CHANGING PLASTIC POLICIES IN PANDEMIC
Many precautionary measures have been specified by the Government in India and worldwide to mitigate Covid-19. These preventive measures have brought a lot of change in the working of the plastic industry as well as the whole waste management sector.

1. Due to the fear of COVID-19 infection, discarding the external packaging of the items immediately is believed to be a safer option. With the policies that restricted the use of single-use plastics being suspended during the pandemic, many food vendors and grocery stores eventually shifted entirely to the use of the disposable bags, plates and cutlery which are difficult to recycle [1].

2. Most of the state and local governments across the country have rolled back policies meant to reduce the use of single-use plastic bags. Some governments have delayed new bans on plastic bags and user fees, and suspended existing policies [1]. For example, in March, the Plastics Industry Association (PIA) sent a letter to the U.S. Department of Health and Human Services stating that reusable bags posed a health risk and that single-use bags were the "most sanitary choice" [15].

3. The increased use and consumption of single use plastics during the COVID-19 pandemic is liable to abnormally increase the demand from plastic suppliers. Therefore, more suppliers of plastics will be invited in the current Indian market to meet the increasing demand [16].

4. The price of plastics is linked with the price of the crude oil. The price of oil saw a decline during the pandemic due to various reasons particularly decrease in water, land and air transport due to which there was a decline in plastic resin prices that made the virgin plastic material more competitive vis-à-vis the recycled plastic resin, which directly impacted the recycling sector [19]. This lead to two things - one was the increased circulation of virgin plastics in the country and second was the reduction in the demand for recycled plastic material [17].

5. The mandatory use of personal protective equipment by the public and specifically the masks which are made of nonwoven materials often incorporating polypropylene and polyethylene and its wrong disposal is affecting the environment. For example, the disposable masks if not disposed correctly due to it being light in weight are carried from land boats and landfills by wind and later have a higher chance degrading into micro plastics as well [7].

6. Household waste has become infectious, putting the sanitary workers and rag pickers at risk while handling it, specifically the unmarked medical waste [16]. If this infectious waste is not properly channelized, then it can be a threat to human life as well as the environment.

7. To avoid the spread of COVID-19 virus, uncontrolled landfilling and local burning strategies on plastic waste has increased in some Indian municipalities

[16]. The practice of dumping and burning the used PPEs and masks near crematoriums, hospitals, salons and restaurants has become common due to the fear of the spread of infection.

CHALLENGES TO THE WASTE MANAGEMENT SYSTEM

The pandemic is posing huge environmental challenges to municipal solid waste (MSW) and hazardous biomedical waste management system. There is a major problem associated with collection of domestic hazardous waste (including gloves, masks and other protective gear). According to the CPCB guidelines, the used masks and gloves generated from quarantine or other households should be kept in a paper bag for minimum of 72 hours prior to disposal of the same as general waste since as possibilities of transmitting COVID do exist via dry waste too [22]. Even when there are clear guidelines for it, making people aware about segregation of dry and wet waste along with domestic hazardous waste seems to be a difficult task to achieve in a short span of time. There is lack of training of sanitary staff to handle the generated waste discharged under COVID-19 pandemic, especially of asymptomatic citizens, and this issue needs to be addressed [14]. Teaching every sanitary worker the repercussions of burying or open burning of plastic waste that contributes to a significant amount of hazardous compounds in the environment also becomes important. Regular training of plant staff on handling of infectious waste needs attention of the authorities. The vehicle carrying COVID -19 waste requires disinfecting on a regular basis for the safety of the staff who is carrying it as well as for the safety of the environment. Maintaining the norms of social distancing at waste management facilities is another issue that should be addressed urgently. The challenge of safe disposal and treatment of COVID-19 related biomedical waste is the need of the hour thus emphasizing the importance of increasing the capacity of waste management systems to respond to health crises while keeping in mind safety of every individual and the environment.

POLICY RECOMMENDATIONS

Managing the increase in plastic waste in the post pandemic time will be a huge challenge for the government and for all the other stakeholders responsible for managing it. It is imperative to find effective long term solutions to fix the existing problems in the plastic economy while dealing with COVID-19 crisis. The following recommendations are proposed for the same:

1. Reducing, Reusing and Recycling plastics even more effectively

It is important to reduce the unnecessary plastic packaging which is believed to be a hygiene measure in the times of pandemic. There are chances of contamination during the production and transportation since the virus is said to survive on plastic for up to 2-3 days [18]. The principle of reduction should be considered wherever the use of plastic is unnecessary. For example, gloves should be worn as an additional measure, not as a substitute for hand washing.

Gloves are not required for routine care activities in which contact is limited to a patient's intact skin as stated under national guidelines for infection prevention and control in healthcare facilities by Ministry of Health and Family Welfare. The reuse model can be used specifically in case of surgical masks - these can be replaced by washable cloth masks which can be reused a number of times. Recyclability of items being made for protection against COVID-19 like masks, PPEs, gloves should also be assessed. The recycling of PPE waste from Non-COVID positive houses can be done through awareness generation by urban local bodies.

2. New product development should be encouraged which not only takes care of the 3R's (Reduce, Reuse and Recycle) but also the concept of hygiene. Plastic substitutes which can be easily sanitized and reused should be considered. For example, Treewear is an organization that uses post-consumer recycled plastic for packaging whereby T-shirts are packaged in recycled plastic water bottles which otherwise end up in a landfill [21].

3. Government should look for incentive policy to encourage research and production of eco-friendly and reusable PPE. Alternatives should include completely reusable, recyclable or compostable plastic packaging. Central government under the Pradhan Mantri Bhartiya Janaushdhi Pariyojna (PMBJP) made a recent announcement on promotion of the use of biodegradable sanitary napkins made from bagasse along with natural absorbents like fullers earth and Tragacanth gum powder. It is now being sold at a cost of rupee 1 per piece under the brand Suvedha [20]. Such initiatives should be made more accessible to the public by increasing its availability.

4. Fees, taxes and bans on fuel-based plastics, specifically single-use plastic, should remain incentivized. It motivates individuals to change their behavior in relation to their plastic consumption like carrying their own cloth bags for shopping rather than asking for plastic carry bags from the store.

5. There is need to develop new approaches to improve monitoring and mapping of plastic pollution. For example, use of drones or software applications which can help the urban local bodies to trace the violators or conducting researches which can tap the increased plastic waste generated from the diagnostic tests of COVID-19 and PPE kits may be considered.

6. Development and promotion of new business ideas which can help in collection and sorting of infectious and non-infectious plastic waste is the need of the hour. For example, the companies which can develop reverse vending machines should be tapped. This will encourage people to exchange plastic masks, PPEs and other plastic wastes for some currency.

7. Awareness programs on the consequences of plastic pollution must increase through social media from all the stakeholders and the cases of violations should be strictly monitored and penalized. It can act as a long term strategy

too if plastic pollution is also included in development of curriculum at school and college level.

8. Plastic collection points can be put at various places for collection of waste and a specific recycler can be assigned to maintain those specific points.

9. Consumers as waste generators are supposed to play their role in the plastic waste value chain. They have to manage their plastic waste at household level in order to minimize plastic pollution in the environment. Simple measures as discussed below can help to reduce this threat at individual level:

i. It is true that in times of pandemic, single-use plastic bags or disposable bags are perceived to be a more hygienic option than reusable ones. But one has to make a conscious decision and reduce the use of these single-use plastic bags by carrying a re-useable cloth bag which can be washed and sanitized.

ii. Keeping a check over the recycling regulations in the area where the individual lives can also help the person to make a choice for the packaging that can be recycled.

iii. Individuals can themselves do a plastic waste audit to see which plastic is not required or can be replaced by better and safer materials.

iv. Individually, one can prevent littering in public areas. Improperly discarded masks are commonly found outside restaurants, salons and apartment buildings which could be a potential health and environmental hazard. It is necessary to discard the used disposable PPEs responsibly into appropriate garbage bins.

v. Segregating plastic waste until recycling units are fully functional is very important. It is recommended by WHO that specifically the plastic waste in the form of masks, gloves and kits should be disposed separately in yellow bags for at least 72 hours within the homes, before being thrown out [9].

CONCLUSION

The mismanaged plastic waste was already one of the greatest threats to our planet before the coronavirus outbreak. The sudden boom in the use of certain plastic products in order to keep the people safe is making it much worse. The paper gives an overview about the current challenges the world is facing to manage the changed cycle of plastic waste management during the pandemic. There have been a lot of changes in the policies that limited the manufacturing, sale and use of single-use plastics due to hygiene concerns. There have been changes in the waste management system as the people have become more conscious about separating the waste due to the fear of infection, but considering the amount of increase in plastic waste generation during the COVID-19 crisis in form of PPEs, face masks and disposable packaging, the repercussions of burying or burning of plastic waste are difficult to be taught as well as to preach to the various stakeholders. The pandemic has surely taught us that eliminating plastics is quite difficult, although half of the world is struggling to encounter this threat with reasonable solutions. There is a requirement to

think consciously about building an effective system and develop technological approaches to improve the monitoring of plastic pollution. It is important to bring about a change in our attitudes towards plastic usage, by promoting sustainable behaviour, breaking old habits and adopting new ones.

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