



# Impact of Covid-19 on Domestic Wastes after Lockdown

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**Abstract:** To combat the spread of the COVID-19 epidemic, the Government of India implemented a lockdown plan. The study's major goal was to evaluate the impact of lockdown over household trash, focusing on mask use and handling habits. An online questionnaire survey was done on n=268 households in the Bilaspur district of Chhattisgarh, India, using the snowball sampling approach and n=34 waste collectors were interviewed offline. The population uses an average of two masks every week. Aside from that, a major per cent of participants observed an increase in the amount of medical waste in their household trash can during COVID-19 compared to prior years. The waste collectors noticed differences in the waste's physical qualities, such as a higher percentage of dry waste compared to moist waste. To reduce waste generation and overburdening at waste treatment sites, the "3R Masks Waste Reduction Model" has been proposed.

**Keywords:** Mask, Medical wastes, Precautionary material, Pandemic, Population

Human coronaviruses (HCoVs) have been causing respiratory infections in various regions of the world since January 2020 (Atwal 2021) and it has become an outbreak in several nations. In the absence of a specific vaccination or cure for the coronavirus, some countries, including India, have decided to implement a lockdown strategy. The lockdown was intended to keep people at home for a few weeks to months. During the lockdown, there was a 70% drop in people moving to public places like parks, workplaces, and metro stations, and a 50% increase in people going to grocery and medical stores, while there was a 22% increase in people going to home areas in India (Kawoosa 2020). The members residing in a house and time of year like summer, winter, and rainy affect domestic waste generation's quantity and composition. Besides these the society, the people living inside it, their economic status, the art of living and its scale of development in the sectors of institutions, business and industries are considered major factors that affect waste (Jouhara et al 2017). During this period, two different kinds of waste are generally produced i.e., waste generated through households and waste generated through healthcare facilities which creates further challenges in the management of this solid waste (UNEP 2020). The wearing of masks in society was one of the major guidelines or suggestions provided by Health officials from various countries like the United Kingdom, Germany and Singapore (Feng et al 2020). An Infected person uses a mask to stop the spreading of infection whereas a well person uses a mask for safety when in being contact with an infected person (World Health Organization 2020). The large

numbers of people were using masks resulting in harm to the environment in a new way by adding more waste in form of an infected mask (Fadare and Okoffo 2020, Patrício Silva et al 2020) and also creating problems for upcoming sustainable waste management activities (Ilyas et al 2020). Poor management of solid wastes can raise the chances of coronavirus infection, mainly in developing nations (Mol and Caldas 2020). Recently, an emerging risk to World's ecosystems is the hazardous medical waste that originated due to COVID-19 which is generally made up of plastic. (Saadat et al 2020). The study aims to analyze attitudes towards the use, disposal of masks and the amount and quality of domestic waste generated by the people of district Bilaspur situated in the Chhattisgarh state of India after the lockdown period.

## MATERIAL AND METHODS

There were two targeted groups for sampling first one was the population who were using masks and the second one was the waste collectors; each person have a vehicle to collect the wastes from a particulate locality. The sample size for the first group was n= 268 and an online questionnaire were prepared to avoid contact with people during the pandemic. The self-administered questionnaire(Gupta et al 2021) containing open and close-ended types of questions and a snowball sampling method were adopted to cover the sample group. For the second group sample size was n= 34(50% of the total waste collectors). The vehicle collects the wastes from door to door in different localities of the area. To contact the second group, 4-5 people group interviews had

been taken at their vehicle stand center one by one and asked questions. After four months of lockdown, the survey had been done because the life of people started again in the office, market, institutions, etc. People started to go out with precautionary materials like masks, gloves, and sanitizers. The per cent of maximum responses were taken as a reference to estimate the average number of masks and then the average number was multiplied by the population of the area for a week and month to estimate the average number of masks used by the whole population of the area. In the absence of current data, the average decadal population growth rate of the state Chhattisgarh from 1971 to 2011 was calculated 22.78% for the population estimation of 2021. The child population from 0-6 years was excluded because they had less interaction with the outside of the area. The responses were recorded in terms of percentages of the total population.

**RESULTS AND DISCUSSION**

**People Behavior Related to Mask**

**Status of respondent:** The respondents were students, job employees, businessmen and others such as unemployed, housewife, labour and their percentage in the total responses were 32.2, 34.5, 14.6 and 18.8%.

**Consumption of average numbers of masks:** The study revealed that the maximum percentage of 63.8 % of responses were used in the range of 1-3 while 23.8% used 4-6 and the very least population 12.3% were using more than 6 masks within a week. The amount of consumption of masks depends on many factors like the rate of leaving the house, the consciousness of the general public related to the use of masks and altering after use and socio-economic aspects (Ouh sine et al 2020). According to the survey, Bilaspur city consumed 4,321,808 masks every month.

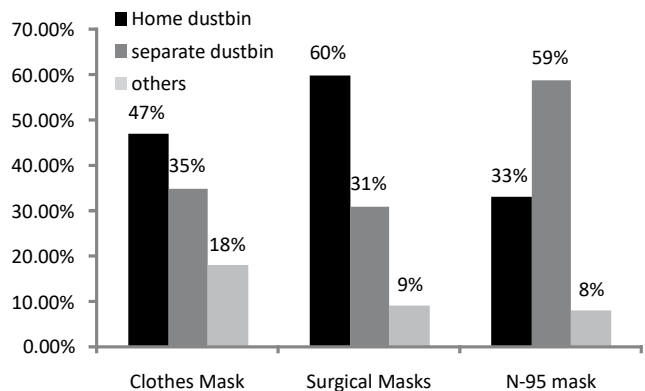
**Types of masks in use:** There were three kinds of masks in use during the period such as i) respirator masks (N95, FFP2), ii) surgical or medical masks and iii) non-certified disposable masks (cloth masks) (Das et al 2020, Ho et al 2020). Clothing masks were used by 56.2 per cent of the population, followed by surgical masks (blue colour 3/6-layer masks), N-95 masks, and others at 24.6, 16.5, and 2.7 per cent, respectively. Figure 2 depicts the various types of masks and their respective weights.

**Handling behaviour of masks:** The maximum number of people (51%) was disposing of used masks in their home dustbin which mixed with other like food wastes. There was 36.8% per cent of the people put mask wastes into a separate dustbin and the rest of the people burned the wastes after using. The huge number of persons who reuse masks after washing could be the cause for the majority of respondents'

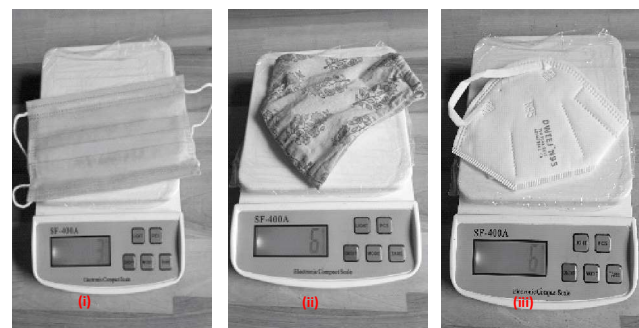
lower mask consumption. Some people use a single cloth mask 2-3 times after washing and drying it, while others burn it after each use.

Medical waste even in the least amount if added to domestic waste gives results in form of hazardous waste, as a result, it can develop into a carrier for the spread of diseases like hospital waste (Ansari et al 2019). The majority of the population who wear cloth masks, as well as surgical masks, were disposing of it in their home dustbins while people who are using N-95 were concerned about infection and disposing of it in the separate dustbin. Some other methods of disposing of the masks were burning and burying them in the pit. The methods of disposing of different types of masks showing in Figure1.

**Type of wastes observed in a home dustbin:** The maximum per cent (47.5%) of respondents observed more amounts of medical wastes like gloves, mask sanitizer bottles, plastic materials in their dustbin compare to previous years because of the use of precautionary materials to protect from the infection followed by food wastes (37.20 %)



**Fig. 1.** Method of disposing of different types of masks by individuals (X-reflecting kinds of masks, Y-reflecting the percentage of consumers who utilize a specific disposal method)



**Fig. 2.** Types of masks (i) Surgical mask (ii) Cloth mask (iii) N-95

may be a reason behind more hours spent in the home and the least respondents observed electric and mobile wastes (5%) may be using online methods for study, job or transaction by electronic equipment's. The wastes like infected gloves, masks and outdated medicines very simply be added to household waste which is supposed to be handled as hazardous waste and discarded alone. The proper management of home waste without any harmful effects could be problematic for the period of the COVID-19 crisis. In addition, the waste has to be collected by a specific municipal worker or waste managing operator (UN 2020). Now a day, this harmful medical waste became a great risk to Earth's ecosystems.

**Responses of waste Collectors**

**The physical property of the wastes:** The waste collectors observed changes in the types of domestic wastes. Before the pandemic percentages of wet wastes such as food wastes and dry wastes such as paper, plastic, rubber and clothes, tin etc. were 50-70 % and 30-50 % which is leading to an increase in dry wastes during a pandemic. The property of waste is leading from moist to dry. According to MoUD, the more dry wastes resulted in reducing the collection and transportation charges and also reducing the emission of carbon from the fuel of the collection vehicles. An increase in dry wastes leads to a decrease in the density of the wastes (mass per unit volume, kg/m<sup>3</sup>).

**Amount of Domestic Wastes:** The 62 per cent of the waste collectors saw a decrease in the amount of domestic waste, 30% saw an increase, and 8% saw no difference in the amount of waste. Decrease in the amount of waste observed

during the lockdown period as they reduce the collection time by coming once in two days and after lockdown, it was found that increases and overburden of the medical wastewereobserved.

**Waste added to the municipal solid waste per day:** Disposable single used masks (especially surgical face masks) were made up of polypropylene (PP) and non-woven fabrics are added regularly which emits 0.02 g CO<sub>2</sub>-equivalent greenhouse gas during its entire lifespan (Türkmen 2021). Table 1 shows the city's daily waste generation in the form of a mask.

**3R Masks Waste Reduction Model**

In May 2021, the second wave of COVID-19 was at its peak in India with the highest number of new cases resulting in 33 per cent of the biomedical waste generated all over the country. The volume that month was huge at places. Chhattisgarh ranked second in the generation of COVID-19 waste of biomedical waste by 42 per cent after Haryana, followed by Andhra Pradesh and Delhi (downtoearth.org 2021). The "3R Masks Waste Reduction Model" has been proposed to overcome the problem of the daily accumulation of large volumes of waste, as shown in Figure 3.

The model follows the concept of three R, "Reduce-Reuse- Recycling". Reduce, the base of the model shows less consumption. For reuse, the people are less prone to be in close contact with patients. According to WHO, the general public under the age of 60 and with no prevailing health issues can use clothes masks in lieu of single-use masks by maintaining physical distancing. The last and third levels group of people who are in close contact with patients for

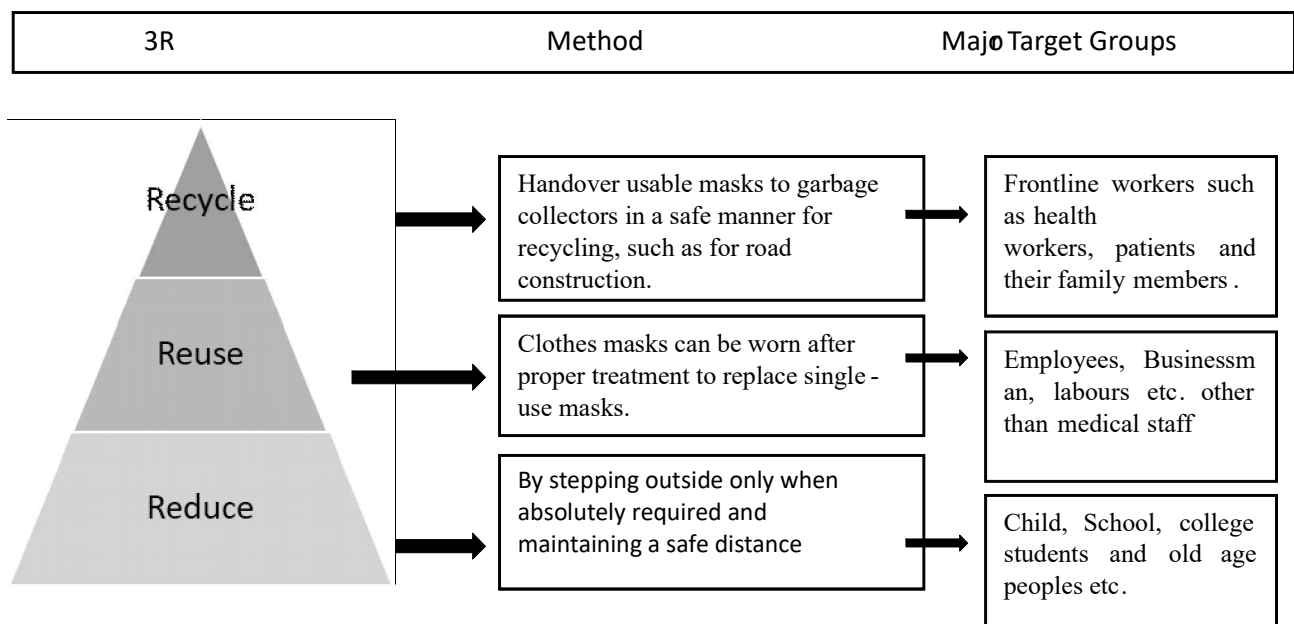


Fig. 3. 3R masks waste reduction model

**Table 1.** Amount of garbage added to the municipal solid waste in different forms of masks each day

Category	Number of mask generation/day	Weight of a single mask (g)	Waste addition/day (kg)
Clothes mask	80,962	6	485.77
Surgical mask	35,439	3	106.31
N-95	23,770	6	142.62
Total			734.7

many hours can keep them in separate bins for recycling. Greater Chennai Corporation (GCC) has issued guidelines for non-quarantined homes and residents. This should be discarded by either incineration or deep burial (The Union Ministry of Health and Family Welfare). According to new guidelines of CPCB (2020), masks and gloves utilized by people other than COVID-19 patients, need to be cut and put inside a paper bag for a minimum of 72 hours before disposing of it. According to Bio-Medical Waste Management Rules, 2016, bar-code bags also can be used to collect wastes (downtoearth.org 2021). For recycling, the wastes masks were used as an experiment in civil construction first time where shredded face masks were added to the recycled concrete aggregate (RCA) for the road base. This study stated that the prepared recycled material used 3 million masks in construction for one km of two-lane roads and prevented from landfill the huge volume of wastes (Mohammad et al 2021).

### CONCLUSION

Despite the fact that the majority of the population is wearing clothing masks, a large volume of garbage is still being added to the waste stream, altering the properties of home waste in the form of contaminated COVID-19 preventive materials which can have a harmful effect on health and the environment in the form of life. The conversion of a large portion of household waste to medical waste has shifted our focus to developing suitable management plans for transporting medical waste safely from homes to disposal sites. The incidence of the infection may change people's lives in such a manner that they will continue to use precautionary materials even after vaccination, and the habit will be better for protecting against many infectious diseases, but it should be necessary to take environmental considerations into account. The proposed model is intended to assist in reducing trash overflow into waste treatment sites.

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