

# Environmental Analysis of Massive Mask Waste due to the Covid-19 Pandemic in Indonesia

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## Abstract

The Covid-19 pandemic has a big impact. The requirement to use masks to prevent the spread of the virus increases the amount of mask waste. This study aims to analyze the environment due to the accumulation of mask waste during the Covid-19 pandemic in Indonesia. This research uses the literature study method from various literature references and qualitative analysis. Medical waste that is not managed with proper procedures has the potential to transmit the virus to other people. In addition, the pile of mask waste is also bad for the environment. Various appropriate designs and technologies are made for more appropriate and environmentally friendly management of mask waste.

**Keywords:** Covid-19, Environmental analysis, Indonesia, Mask Waste

## Introduction

In the current state of the Covid-19 pandemic, the public is strongly encouraged and required to comply with health protocols recommended by the government. One of the health protocols that must be done is to use a mask. The proper use of masks has been regulated by the Ministry of Health of the Republic of Indonesia. In circular number of Indonesian Ministry of Health, the recommended masks are of two groups, namely medical masks and masks made of cloth. The medical masks used by medical personnel are in the form of surgical masks and N-95 masks, while masks for all those who have activities outside the home are in the form of 3-layered cloth masks<sup>(1)</sup>.

Even though there are recommendations to use cloth masks, there are still many people out there

who still use disposable masks. Medical masks are considered more effective in preventing Covid-19 transmission. But there is another problem that lurks from using disposable masks, namely the waste that pollutes the environment. The use of disposable masks will result in an accumulation of mask waste. In addition, disposable mask waste can be one of the causes of the spread of the virus if the waste is not treated properly<sup>(2)</sup>.

The use of disposable masks by Indonesians has led to an increase in the amount of mask waste during the Covid-19 pandemic. During the Covid-19 academy, the need for masks increased rapidly, especially disposable masks. The Ministry of Environment and Forestry noted that the increase in medical waste during the Covid-19 pandemic ranged from 30% to 50%. Total waste until October 2020 reached 1,6662.75 tons based on reports from 34 provinces<sup>(3)</sup>. Meanwhile, the current quantity of medical waste in Indonesia has increased by 30% from 296 tons per day before the pandemic and after

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the pandemic to 382 tons per days<sup>(4)</sup>.

In the Jakarta area (the capital of Indonesia) it is known that there are 1.54 tons of mask waste from April 2020 to December 2020. If this problem is not immediately addressed, the mask wastes will not only cause environmental problems but also health problems. Therefore, before the masks are thrown away, it would be nice if the community first processed the medical masks they had used<sup>(4)</sup>.

In processing non-medical mask waste in the community, it is also necessary to follow directions from the ministry of health. According to the Ministry of Health (2020) masks that have been used can be a medium for transmitting viruses and agents that cause disease, and of course, this becomes very dangerous<sup>(5)</sup>. Piles of mask waste can pollute river water because Indonesian people still like to throw garbage in the river. Worse, waste classified as dangerous can cause damage to the environment and the living ecosystems of living things around it (humans, animals, and plants). Following up on these problems, this study aims to analyze the environmental impact of the unmanaged collision of mask waste during the Covid-19 pandemic.

### **Materials and Methods**

This research uses a qualitative approach. The data is sourced from secondary data in the form of reports from ministries, agencies, health and environmental organizations in Indonesia. The analysis was carried out qualitatively. The qualitative analysis in question is an in-depth analysis of the data and events that occur, the problem in this research is to mask waste

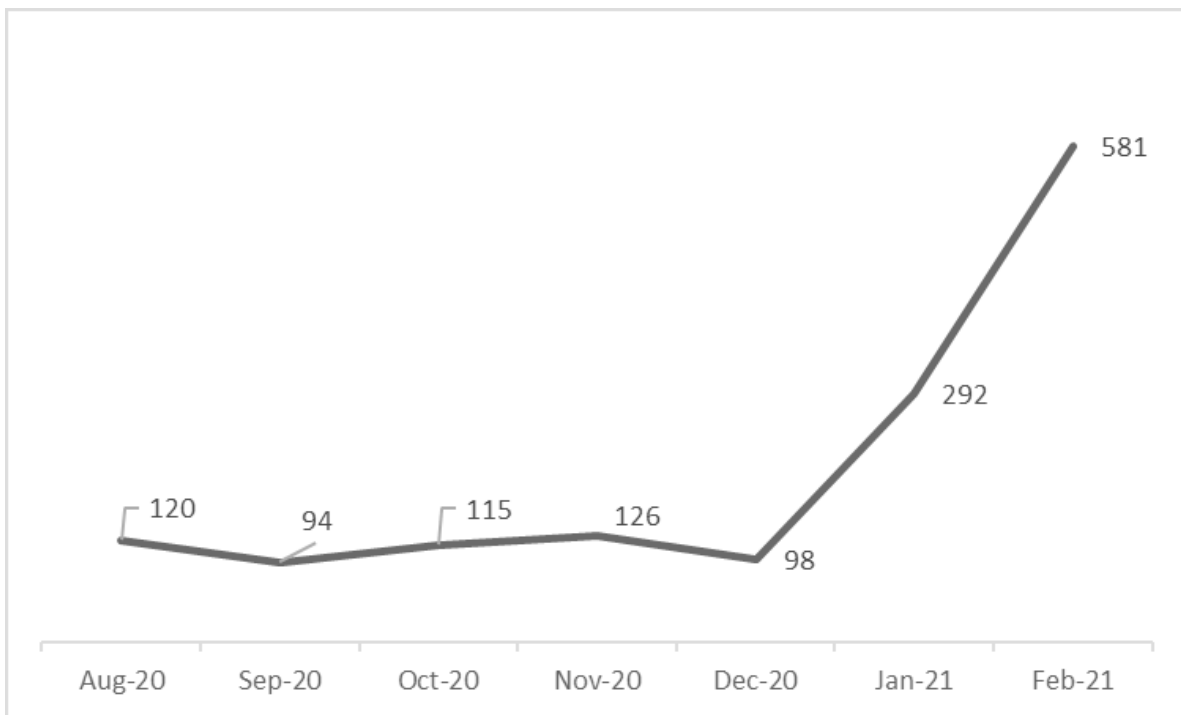
during the pandemic in Indonesia.

### **Results and Discussion**

At this pandemic, many environmental medicine experts and environmental experts warned of an increase in infectious waste amid the Covid-19 pandemic. Based on the Chinese case study, there was an addition of mask medical waste from 4,902.8 to 6,066 tons per day. The same thing happened in Indonesia along with the addition of positive cases of Covid-19.

Before the pandemic, the Ministry of Environment and Forestry estimated the national waste generation amount to reach 64 million tons per year if using the assumption that 0.7 kg of waste produced per person per day is assumed. Waste generation has increased after a pandemic, especially the amount of medical waste. The amount of medical waste has increased by 30-50 percent with the total infectious waste until October 15, 2021, reaching 1,662.75 tons. According to data from the Ministry of Environment and Forestry, the amount of Covid-19 waste generated from March 2020 to February 2021 was 6,417.95 tons.

Not only nationally and in the national capital, the generation of mask waste in various big cities, small cities, and regions in Indonesia has also increased. In Surabaya, one of the big cities in Indonesia which is known for its clean waste management and urban planning. In February 2021, the mask waste collected at nine reduce, reuse, and recycle collective landfills in Surabaya reached 581 kilograms. Meanwhile, at the beginning of the recording of mask waste in August 2020, the amount collected was 120 kilograms.



**Figure 1. Graph of the Amount of Medical Waste at collective landfills Surabaya**

Worldwide Wildlife Fund (WWF) reported concerns about the wrong disposal of mask waste, saying: “If only 1 percent of masks were disposed of improperly, this would result in 10 million mask per month which scattered in the environment. Considering that the weight of each mask is about 4 grams, this would require dispersion of more than 40 thousand kilograms of plastic in nature.

Masks of waste are disposed of carelessly in public garbage dumps, rivers, and other places in intact condition without being treated first. The environmental impact will be caused widely. In addition, the dangers of medical waste not only have an impact on the environment but also have the potential to spread viruses. Masks can be used to prevent us from infecting others. But masks have the potential to infect if we throw masks used in the trash and even in places where there is no safety. As we know, the spread of the coronavirus through the droplets of infected people. Not only when we talk to infected people, but droplets that stick to the surface of an object can also be a medium of transmission.

“If we touch the surface of an object and the hands stick to the nose, eyes, or mouth, the coronavirus will stick to the surface of our respiratory tract through the interaction of the protein spike that interacts with the ACE 2 receptors in the breath.

Both medical disposable masks and ordinary masks must pass through washing process with detergent or disinfectant to get rid of viruses. Especially for disposable masks, after going through the disinfection process, they need to be destroyed by cutting or tearing all parts including the hook straps.

Mask waste needs to get special treatment from the officer. processing before being destroyed. For example, mask waste must be separated separately. Masks must also be cut. Then soaked with disinfectant liquid. Management of medical mask waste is a big challenge, so it needs support from all sectors. treatment capacity and emerging waste piles, distribution of treatment facilities, coordination between agencies, and the role of local government and financing issues.

The World Health Organization (WHO) and Public Health England (PHE) have issued recommendations on the management of PPE waste which includes medical masks to be put in two-layer yellow plastic bags which are then stored for 72 hours in temporary storage/shelters before being disposed of at the facility. final stage waste treatment. With such treatment, it is hoped that the virus that may be present in PPE will die before being taken to the final stage of the waste treatment facility. In addition, it is recommended that medical mask waste not be burned because it is feared that it will become waste of hazardous and toxic materials which can pollute water, soil, and air<sup>(6)</sup>.

The Ministry of Environment and Forestry has also regulates the management of disposable mask waste from household waste<sup>(7)</sup>. In addition, the Indonesian Ministry of Health also provides guidelines for managing disposable mask waste used by ordinary people<sup>(8)</sup>. In processing medical waste, the procedure has been regulated in the Minister of Environment Regulation concerning Procedures and Technical Requirements for Management of Hazardous and Toxic Waste from Health Facilities. The COVID-19 Handling Task Force through the Waste Sub-Sector is making appropriate policies for community COVID-19 waste management involving the Ministry of Environment and the Ministry of Health. The Task Force itself has so far provided 5 incinerators to 5 provinces in Indonesia and helped manage waste in several major hospitals in DKI Jakarta.

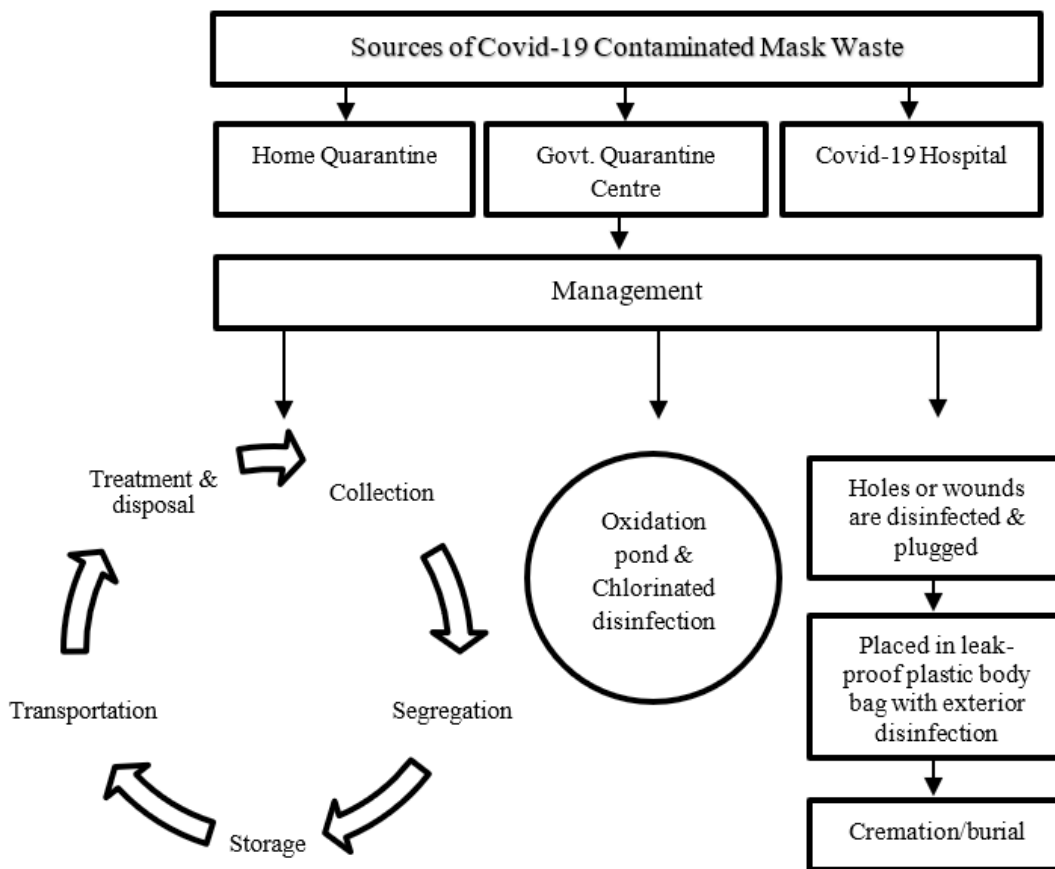


Figure 2. Schematic flow diagram for safe management of COVID-19 waste

Covid-19 waste treatment is most effective with the use of chemicals. Previously, waste was separated from

its source category. Based on the source, it is divided into five, namely home quarantine, government quarantine center, covid-19 hospital, wastewater from medical centers, homes and quarantine, covid-19 bodies<sup>(9)</sup>. Then all waste based on the five sources is managed. Waste management is divided into three parts. The initial part is the waste collection, waste

separation, storage, waste transportation, and finally waste processing and disposal. The second part is the chlorinated oxidation and disinfection pool. The last part is making holes or wounds disinfected and plugged in, then placed in a leak-proof plastic bag with exterior disinfection and finally cremation or burial<sup>(10)</sup>.

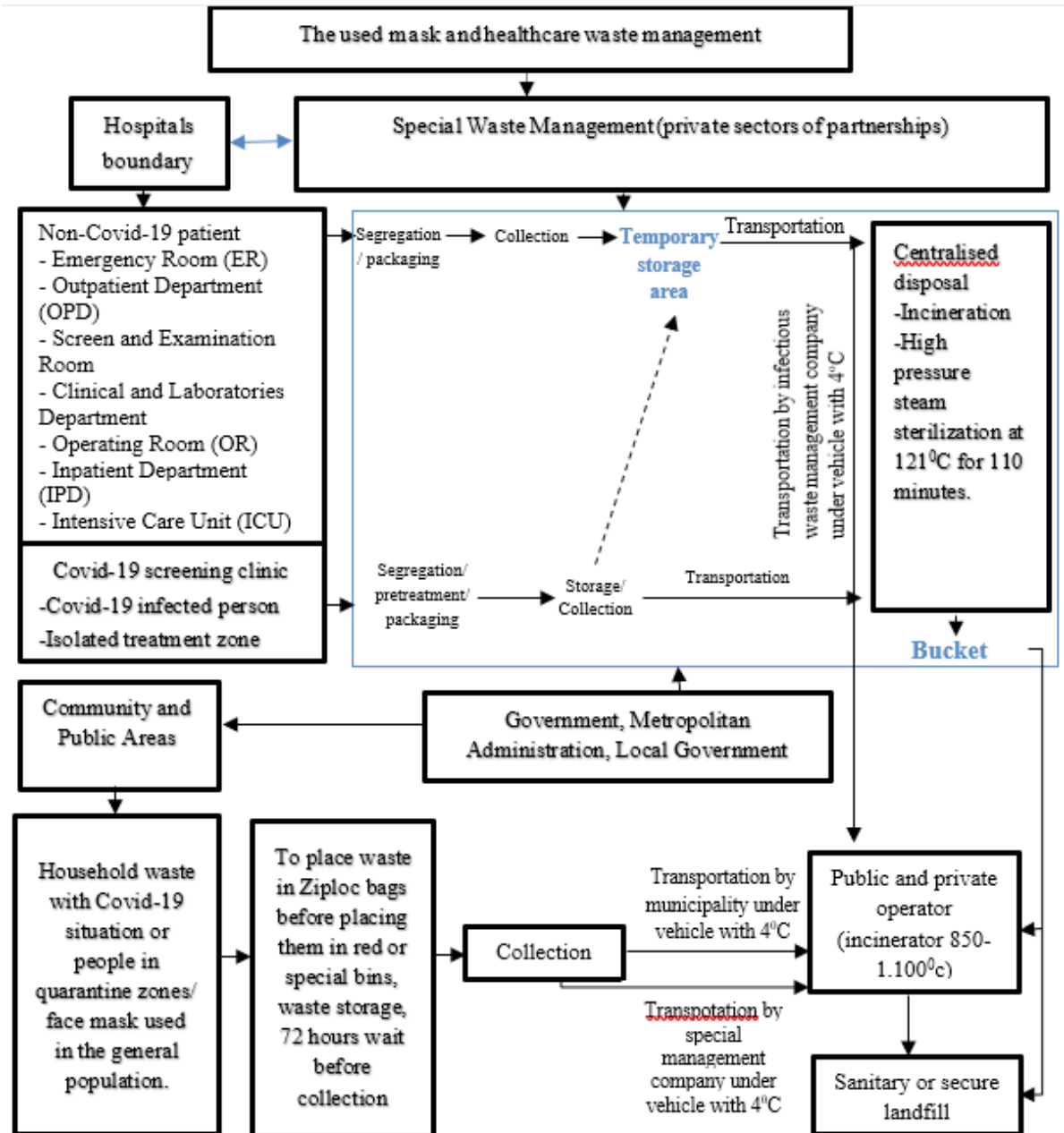


Figure 3. Schematic Flow Chart of Medical and Household Waste Management During the COVID-19 Outbreak

## Conclusion and Acknowledgement

**Management of mask waste management is carried out comprehensively using appropriate procedures to prevent environmental impacts. Various designs and innovations are made for maximum results.** Covid-19 waste treatment is most effective with the use of chemicals. Besides, The Task Force itself has so far provided 5 incinerators to 5 provinces in Indonesia and helped manage waste in several major hospitals in Jakarta.

**Ethical Clearance :** We have no ethical clearance to disclose. We have coordinated with the ethical clearance committee of the Research and Development Institute, Ministry of Health of the Republic of Indonesia. This research paper does not require ethical clearance. This research does not use human subjects or other living things. The data presented in this study is not in the form of data on living things, but in the form of modeling to develop science and promote environmental medicine.

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