

## Key Messages:

- **The coronavirus (COVID-19) pandemic has had negative effects on waste management**, such as increasing both medical waste and household waste.
- **Fast adaptation through strengthening policies related to infectious waste**, such as protection for waste collection workers and the informal sector, source separation and collection with higher frequency, and monitoring floating river waste, is key to mitigating virus transmission.
- **Scavengers become the most vulnerable to COVID-19 exposure** and require basic knowledge of health, protective equipment, and financial support, as well as protection from stigmatisation.
- **Optimising the reverse logistic system through the instalment of temporary incinerators** with pollution control is effective for short-term mitigation, which results in better risk control.

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# Strengthening Waste Management Policies to Mitigate the COVID-19 Pandemic

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*The coronavirus (COVID-19) pandemic has raised issues with waste management. In Association of Southeast Asian Nations (ASEAN) countries, the increasing amount of medical waste during the pandemic is not in line with the availability of waste management facilities. Furthermore, the amount of plastic waste is also rising because people rely more on food delivery services. This causes a plastic waste ban roll-back in some countries. In this difficult situation, it is crucial for ASEAN countries to strengthen their waste management policies. Also, protection of all parties, including informal workers, must be considered to enforce a clean and healthy work environment.*

## The Environmental Impacts of COVID-19

As the virus has been spreading globally, there has been a dramatic reduction of activity in some sectors, such as manufacturing and transportation, caused by lockdown and self-quarantine policies. These policies reduced fossil fuel consumption and oil-refining activities (Chrobak, 2020), and led to the cancellation of 60% to 95% of flights (Hamwey, 2020). Accordingly, there has been a reduction in carbon emissions. An analysis of energy demand in China shows that emissions have decreased by 25% since the outbreak hit the country (Myllyvirta, 2020). This is highlighted because China previously was the biggest carbon emitter in the world (Climate Action Tracker, 2020).

Although COVID-19 has brought some fresh air to our polluted world, it still creates another environmental concern. According to the World Health Organization (WHO), at the end of June there were 'over 10 million cases of COVID-19 globally' (WHO, 2020a). This has put a burden on health facilities that are struggling with an increasing number of patients, with a higher amount of medical waste as an unavoidable consequence (Calma, 2020). Malaysia saw a 27% growth in medical waste in March 2020, a 10% increase from the previous month (Hakim, 2020), while in Jakarta, Indonesia, the increase was 30% (Rikin, 2020). In Wuhan, China, the original epicentre of the pandemic, the amount of medical waste skyrocketed from 40 to 240 tonnes per day (Brunell, 2020). In this unprecedented situation, WHO identified that a droplet from an infected person can land on objects and surfaces that might be touched by other people. Those people can also be positively infected if they touch their eyes, noses, and mouths later (WHO, 2020b). As a result, the need to dispose of medical waste soon became fundamental to prevent the spread of the virus. Unfortunately, a massive amount of medical waste has overwhelmed the waste collection system. Additionally, not all hospitals are equipped with incinerators (Aqil and Dipa, 2020), whose technology is perceived as the most effective since it can kill the virus with its high temperature (Hermann, 2020).

In Indonesia, the Circular Letter on Medical Management of Infectious Waste (B3) in COVID-19 Emergency Health Service Facilities mandated the use of licensed incinerators with a minimum temperature of 800 degrees Celsius (Rikin, 2020). Nonetheless, incinerators must have proper pollution control to prevent the generation of dioxin, which can cause another health issue (Ministry of Environment of Indonesia, 2014).

Apart from medical waste, household waste is another issue. During the pandemic, the stay-at-home policy adopted by many countries (Baker & Salamat, 2020; Cahya, 2020) urges each individual to do their activities from home, including working, studying, and worshipping (Cahya, 2020). Since people have to stay in their homes all day, there are changes in people's behaviour. At this moment, people rely more on food delivery because restaurants are closed for in-house dining (Brunell, 2020). As a result, the issue of plastic pollution comes to the surface, since food delivery is frequently wrapped with layers of plastic packaging (Hamwey, 2020). The concern, furthermore, keeps developing since some companies, such as Starbucks, are now banning reusable cups to preserve hygiene (Evans, 2020; France-Presse, 2020).

In this challenging situation, recycling is also problematic. First, safety for recycling workers remains a challenge since they must be fully protected during their work as waste may be contaminated with the virus (Brunell, 2020). Second, in some areas, such as Bantar Gebang landfill in Indonesia, recycling facilities have stopped, reducing the price of recyclable waste (S. Sasaki, personal communication, 2020). This reduces the income of the waste pickers who depend on the facility to make a living. Although it is difficult to estimate, the informal sector is more vulnerable to these changes, as addressed below. Correspondingly, due to economic recession and low oil prices caused by COVID-19, the demand for plastic waste for recycling has been decreasing.

## Current condition in ASEAN countries

The rapid transmission of COVID-19 has had serious impacts, especially in developing countries, including the Association of Southeast Asian Nations (ASEAN) countries. A weak infectious waste management system in ASEAN countries will potentially speed up the growth of COVID-19.

As the most populous country in ASEAN, Indonesia is required to make extra efforts in managing their waste, especially the current explosive amount of medical waste. Moreover, as an archipelago country, Indonesia is vulnerable to medical waste leakage to any waterway. Although the amount of waste sent to landfills has shrunk by up to 40% due to the decrease in waste generated in offices, restaurants, and industries, the growing amount of medical waste is now a pressing issue. In Jakarta itself, the amount of medical waste reached 12,740 tonnes 60 days after the virus attacked the region. At the same time, there is a gap between the amount of medical waste generated and the available treatment capacity (Anwar, 2020). Out of 2,820 hospitals nationwide, only 87 are equipped with incinerators to treat the waste on site (Aqil and Dipa, 2020).

Furthermore, the role of informal sectors must also be considered. For instance, scavengers, who are mostly less

educated, not registered, and uncontrollable, are incredibly vulnerable without any intervention to business-as-usual. The government should intensively disseminate basic knowledge on health, provide sufficient protective measures, and distribute financial support for them. In addition, eradicating stigmas is another challenging issue. Enacting social mechanisms that legitimise their work, which is often considered as dirty night work, is key.

To address these issues, Indonesia, on 24 March 2020, issued the Circular Letter on Infectious Waste and Household Waste Management during the COVID-19 Pandemic (Aqil and Dipa, 2020). The Circular emphasised measures on the management of (1) infectious waste from healthcare facilities, (2) infectious waste from people under surveillance during home quarantine, and (3) regular household waste containing face masks or other protective gears. One of the necessary measures is the collection of infectious waste that should be wrapped in a closed container at least once every 2 days for incineration. The residue must be labelled as hazardous waste and handed over to the licensed treatment service provider. Healthy people are encouraged to use a reusable mask with daily washing; meanwhile, a disposable mask should be soaked or sprayed with disinfectant, replaced if cut or torn, and neatly packed before disposal. Local governments are instructed to provide individual boxes for mask waste disposal in public areas. However, policy enforcement always becomes a challenge for Indonesia. By warning of health risks, it is then expected the policy can be implemented, not only for individual concern but also for solidarity amongst people.

Although different in scale and complexity, Indonesia's policy enforcement measures can be informed by similar efforts in Viet Nam. Robust enforcement measures allowed Viet Nam to limit the number of infected cases. Viet Nam applies similar measures such as source separation and collection with sealed bags, with higher collection frequency, at least twice a day (Việt Nam News, 2020). The collected waste must be treated within a day, referring to several technical standards. Meanwhile, liquid waste must be disinfected and then delivered to concentrated wastewater plants for further treatment. Such strict enforcement results in a relatively low number of infected cases, with no deaths so far.

Thailand has been reporting an increasing amount of household plastic waste which is or might become infectious waste as well. The Thailand Environment Institute estimates that the amount of mask waste increased to 1.5–2 million pieces a day (Pattaya Mail, 2020). Plastic waste, in general, was increasing from 1,500 to 6,300 tonnes a day due to increasing orders for food delivery (Pattaya Mail, 2020). It shows that although 2020 is an excellent year to fight against plastic waste, the single-use plastic bag ban, which was enacted 1 January 2020, should be rolled back (Storey, 2020). To reduce physical contact with waste, bigger plastic bags may be better for waste collection. It is preferable to use transparent plastic bags for detecting any potentially infectious waste inside. In addition, the use of masks, gloves, and other protective equipment based on specific guidelines is mandatory for waste pickers. Furthermore, citizens should raise awareness to respect waste pickers by utilising only such plastic bags for disposing of their waste.

To address this conflict of environment and health concerns, monks in Chak Daeng Temple proposed one exciting initiative. The monks usually make robes from recycled plastic. However, during the pandemic, they have instead been producing face masks with a particular layer that seems more effective to protect from spray droplets of the virus (The Guardian, 2020). Using a 400 ml plastic bottle for every mask, volunteers can sew 100 masks per day (Fernandez, 2020). Similar efforts can be seen in East Java, Indonesia, where people begin to recycle plastic since its supply, which is usually imported from China, is shut off during the pandemic (Liputan 6, 2020). And in the Philippines, local recycling industries utilise nonwoven polypropylene, which is reusable bag material, to produce protective suits for non-health care workers who are exposed to the risk, such as policemen, firefighters, and waste pickers (Fernandez, 2020). The Temasek Foundation in Singapore offered 500 ml of alcohol-free hand sanitiser to almost 1.5 million households through a bring-your-own-bottle scheme (Fernandez, 2020). These attempts might be excellent initiatives to deal with current health concerns without compromising environmental sustainability.

Furthermore, Malaysia emphasises another point of view to manage infectious waste. Because its clean up of the Klang River found possibly infectious waste, including mask, gloves, and sanitiser bottles (Zikri, 2020), Malaysia, through Selangor Maritime Gateway (SMG), conducts real-time monitoring to alert any possible contamination. Besides, SMG has been including disinfection processes in the water supply system and the water treatment plant, after revealing that the virus is sensitive to oxidants such as chlorines.

## Lessons learned from Wuhan

As the first city suffering from COVID-19, Wuhan took comprehensive measures to mitigate the pandemic in various sectors, including solid waste management, followed by the more significant challenges of medical waste from designated hospitals, isolation areas, and shelters. Wuhan has chosen an inclusive approach that prioritises safety for solid waste management, including collection, transportation, and disposal (Zhang, 2020).

First, Wuhan improved the whole process by closing the municipal solid waste disposal site and enhancing disinfection and sterilisation of any waste-related facilities. The municipal solid waste disposal site was considered for closing due to the lower daily amount of municipal waste generation, from 12,000 tonnes in 2019 to 6,800 tonnes as an impact of lockdown policy. The collected municipal solid waste is sent directly to designated incineration plants. Moreover, daily disinfection and sterilisation are undertaken according to technical standards. Second, Wuhan's medical waste collection is carried out with strict technical guidelines to avoid more extensive virus transmission. So far, 5,200 tonnes (about 90 tonnes/day) of medical waste have been collected from individual containers set up inside and outside of medical-related places and containers for mask waste in public areas. The medical waste is transported and disposed of through specially designed registered vehicles and operated by professional workers at a scheduled time. To address the problem of medical waste from designated hospitals, isolation areas, and shelters,

Yu et al. (2020) suggested installing temporary incinerators to manage the tremendous increase of such waste, especially after considering the space, cost, and time constraints. As a short-term decision with varied cost-effectiveness, the instalment of temporary incinerators is an integrated part of the reverse logistic system that results in better risk control (Yu et al., 2020). Third, Wuhan equipped the related workers with protective pieces of equipment, including masks, gloves, goggles, protective clothing, and disinfectants. The authority also grouped workers to allow them to stay in one area and required them to apply self-quarantine and regularly check their body temperature. Through these measures, in addition to other measures such as lockdown, Wuhan has effectively controlled the growth of the pandemic.

## The Need to Adapt Fast

During the rapid growth of COVID-19, especially in ASEAN countries, fast adaptation to current waste management policies is critical. The pandemic could be a positive opportunity to manage the waste even better. A healthy environment under the principle of 'leaving no one's health behind' will become a priority post-COVID-19 (Storey, 2020). Some policy recommendations from ASEAN countries and Wuhan can be adopted, including strengthening waste management policies, especially policies related to infectious waste. Second, applying an inclusive approach can be achieved by considering all parties, particularly the waste collection workers, scavengers, and the workers in recycling centres who are vulnerable to be contaminated by the virus. Besides physical protection, they also require protection from stigmatisation by collectively showing respect and appreciation for their significant contribution during the pandemic. Lastly, besides prioritising the safety of all parties, managing a market mechanism is also needed to financially support the scavengers who lost their source of income because of the drop in recyclable waste prices during the pandemic. ASEAN Member States can raise awareness of this issue, learn from each other, and adopt better policies. The policy adoption will not only help to mitigate the pandemic in the short term, but will also create a better waste management structure in the long term.

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