

**COVID-19 Pandemic Pushes Single Use Plastic Waste
Outbreak: No Management, No Protection: High Health
and Environmental Risk Unveil**



14,165 tons plastic
waste in a month

COVID-19



"Dhaka has spawned
some 3076 tons of masks,
hand gloves, polybags
single use plastics waste
in ever first month of
COVID-19
community spreading"



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#break
free
from
plastic



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Research Advisors:

Syed Marghub Murshed and Prof. Abu Jafar Mahmood

Team Leader:

Shahriar Hossain, PH.D.

Editorial Team:

Ms. Siddika Sultana, Sayda Mehrabin Shejuti

Research Associate

Nazma Ahmed

Research Team:

Sharmin Ashrafi, Zarin Tasnim, Samina Khondaker

Support Team:

Md. Ali Hossain, Nadia Chowdhury, Mamun Ul Hasan, Khalilur Rahman, Golam Rabbani,

Quazi Shahreen Haq

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Contact Address:

House# 8/1, Level# 5, Block#C, Lalmatia, Dhaka- 1207, Bangladesh
Phone: 880-2-9122729; Fax: 880-2-8100527, Email: info@esdo.org
Web: www.esdo.org www.bansup.esdo.org

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Executive Summary

At the end of the very first month of the official lockdown to prevent COVID-19 spread in Bangladesh, about 14500 tons of hazardous plastic waste has emerged from the dramatically increased use of single use surgical face masks, hand gloves, hand sanitizers and polythene bags in communities and health care facilities, a recent study by ESDO reveals. About 11.2% of this waste apparently comes from the use of surgical face masks, 21.5% from polythene made normal hand gloves, 20% from surgical hand gloves, 40.9% from the single use polythene shopping bags used for carrying food items and 6.4% from empty containers of hand sanitizers. ESDO has recently conducted a study on single use plastic waste generation at the advent of coronavirus pandemic in Bangladesh. The study surveyed over more than 570 individuals from different stakeholder groups by means of different long-distance communication including online surveys and telephone interviews. The research has portrayed country's hazardous plastic waste generation scenario in the first month of the official lockdown phase extending from 26th March, 2020 to 25th April, 2020. Inevitable use of single use plastics at community and household level has augmented many folds since the outbreak of the deadly coronavirus disease in Bangladesh. The use of polythene and plastic shopping bags at community level has been growing at an unprecedented rate than ever. Besides, use of personal protective equipment (including face masks and hand gloves) as part of individual awareness has become common among all levels of community people, which are in many of the cases made up of plastics. ESDO's new study findings indicate that, most dominant kind of single use plastics, the usage of which have been experiencing unprecedented rise since COVID-19 emergence in Bangladesh includes – surgical face masks, hand gloves (surgical/normal polythene made gloves), polythene shopping bags and hand sanitizer containers.

About 85% of the population in Bangladesh are using some sort of masks but not all of them are single-use surgical face masks. A great majority have been using cloth masks. Nearly 23% of the entire population are currently using single-use surgical face masks of whom 20% are based in the urban locations and the rest 3% are based in rural areas. An estimated 455 million surgical masks have been used by the entire population during the last one month giving rise to an estimated 1592 tons of disposable plastic waste. In the capital city of Dhaka, the rate of use of surgical face masks are relatively higher compared to other urban areas. About 35% of the people, currently

residing in Dhaka, are using surgical masks on regular basis while going outside accounting for about 28% of the entire generation.

During the time of COVID-19 spread, growing tendency of using disposable hand gloves has become evident both in urban and rural areas of Bangladesh. Two different kinds of hand gloves are being used by people – polythene made hand gloves and surgical hand gloves. The use of surgical hand gloves is evident in some of the major cities of the country (including Dhaka, Chittagong, Sylhet, Rangpur, Gazipur and Narayanganj) while people in most of the districts have preferably adopted the use of polythene made lightweight hand gloves. Current study suggests that, around 30% of the entire population in Bangladesh have adopted the use of polythene made hand gloves while dealing with outdoor activities. Majority of this population are based in urban areas (25%). City dwellers and street vendors in urban areas are, apparently, the major users of single-use hand gloves made up of polythene. Alone from this source, an aggregated 1216 million gloves have been disposed by the population in the last one month referring to the generation of an estimated 3076 ton of disposable (single use) plastic. Of this, nearly 20% emerged from the capital city alone. An average 9% of the population around the county has also been found to be using relatively heavy weight surgical hand gloves.

Polythene shopping bag has been identified as the largest source of single use plastic waste generation in Bangladesh during the ongoing COVID-19 response phase accounting for about 5796 ton of plastic waste in a single month. Use of polythene has increased many folds in communities as people tend to buy food items in polythene covers to protect them against infection. Apart from regular household use, polythene is being largely used for relief distribution and takeaway food packaging purposes as well. Alone in Dhaka, around 443 tons of plastic waste has been estimated to be generated from the use of polythene shopping bags in communities and distribution of relief items among the poor and the distressed in polythene packets.

Besides, surgical masks, hand gloves and polythene bags, containers of hand sanitizers, that are being massively used in the current context are also generating certain amount of single use plastics. Research findings suggest that, around 30% of the total populations use hand sanitizers in Bangladesh mostly in urban locations. The empty containers of the hand sanitizers reportedly contributed around 900 tons/month in the COVID-19 generated single use (onetime) plastic waste stream.

Health care facilities (hospitals, medical care centers) has been identified to be one of the major sources of infectious or hazardous plastic waste generation during COVID-19 response. Experts opine, the doctors and nurses in dedicated COVID-19 hospitals, who came in close contact with COVID-19 infected and suspected patients during the last one month had to frequently use and dispose surgical masks and gloves, along with other personal protective equipment. However, doctors in general hospitals have also been using masks and hand gloves as part of extended precautions. All these has supposedly resulted in the generation of an estimated 250 tons of single use plastic arising from the hospitals during the last one month solely from the use of surgical masks and gloves by health professionals. However, sample testing pathological laboratories dedicated for COVID-19 testing has generated an additional 1.1 ton of singles use plastic waste.

Improper disposal of hazardous COVID-19 plastic waste can cause massive pollution of environmental components including soil, water and air. Medical waste is particularly difficult to handle as it is a mix of both wet and dry waste, is highly contagious. When a high volume of medical wastes gets generated within short time interval it becomes often impossible to segregate the waste and treat them before sending them to landfill or to incinerate. As bulk quantity of highly contagious medical waste (a great majority of which are plastics) are incinerated in normal incineration facilities, it causes the release of highly toxic gases, fumes, heavy metals and contagious airborne substances as well severely affecting the nearby air quality. If the contaminated wastes are directly dumped into the landfills without treatment, the infectious substances may get mixed with the soil and rainwater and ultimately get carried away to water bodies and groundwater as toxic leachates. These chemicals are absorbed by plants which are later utilized by other organisms including humans which as a result can cause disease or even death. Improper waste disposal can also interfere with the food supply as plant growth is impaired reducing the amount of food produced.

Waste collectors get directly exposed to hazardous plastic wastes during collection, handling and transportation of infectious wastes from sources to storage facilities. Discarded masks, gloves and other PPE could be potential sources for the spread of this highly contagious virus. As the virus can survive and remain active up to several days on plastic surfaces, when the discarded plastic wastes are collected or handled by waste collectors or personnel in waste management facilities without taking protective measures, it may get them infected. Informal waste collectors in Dhaka are

working without adequate protection with heightened risk of getting infection from hazardous wastes. In normal times, more than 1,00,000 informal waste collectors work to maintain the city's cleanliness and hygiene but currently, an estimated 6000 plus informal waste collectors are associated with the municipal waste collection and management process. At the advent of the coronavirus outbreak, most of the waste collection workers are absent from the work or have self-withdrawn from this work due to persisting lockdown.

Major findings

Summary Table: Single Use Plastic Waste Generation in communities During COVID-19 Response in Bangladesh (26th March- 25th April 2020)

Single- Use item	Numbers (in million)	Weight (in Ton)
Surgical Masks	455	1592
Polythene Hand Gloves	1216	3039
Surgical hand Gloves	189	2838
Polythene Bags	1449	5796
Hand Sanitizer Bottles (ml)	49	900
Total	3,358	14,165

Summary Table: Single Use Plastic Waste Generation during COVID-19 Response in Dhaka (26th March- 25th April 2020)

	Numbers (in Millions)	Weight (In tons)
Surgical Masks	128	447
Polythene Hand Gloves	241	602
Surgical Hand Gloves	87	1314
Polythene Bags	111	443
Hand Sanitizer Containers (ml)	15	270
Total	582	3,076

Projection of Plastic Waste Generation from 26th March-25th April, 2020 in Dhaka City and Bangladesh

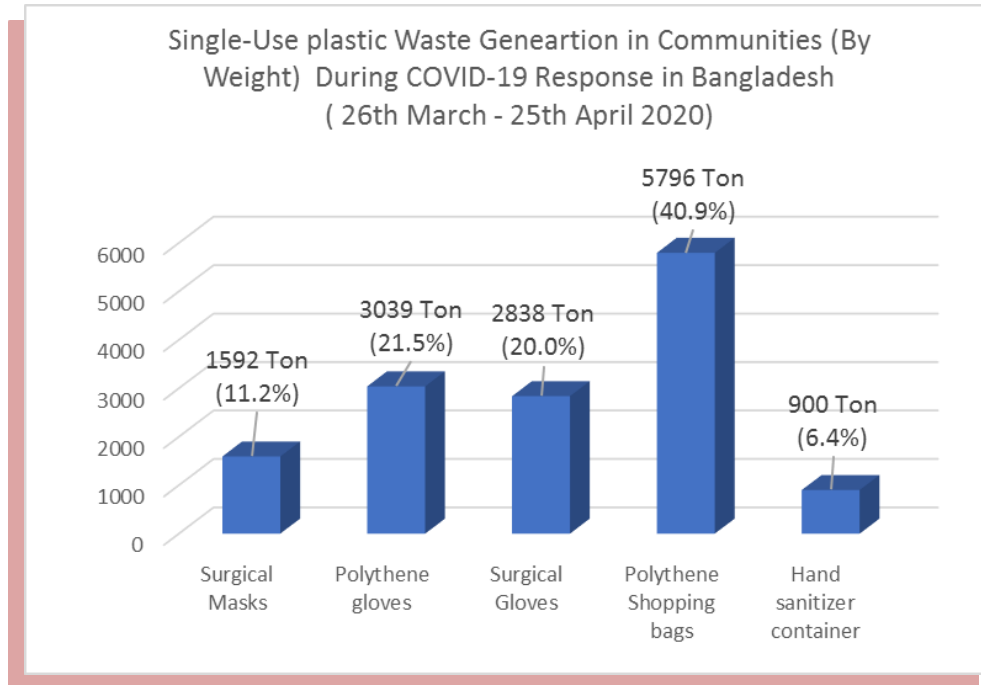


Table-1: SUP waste by weight

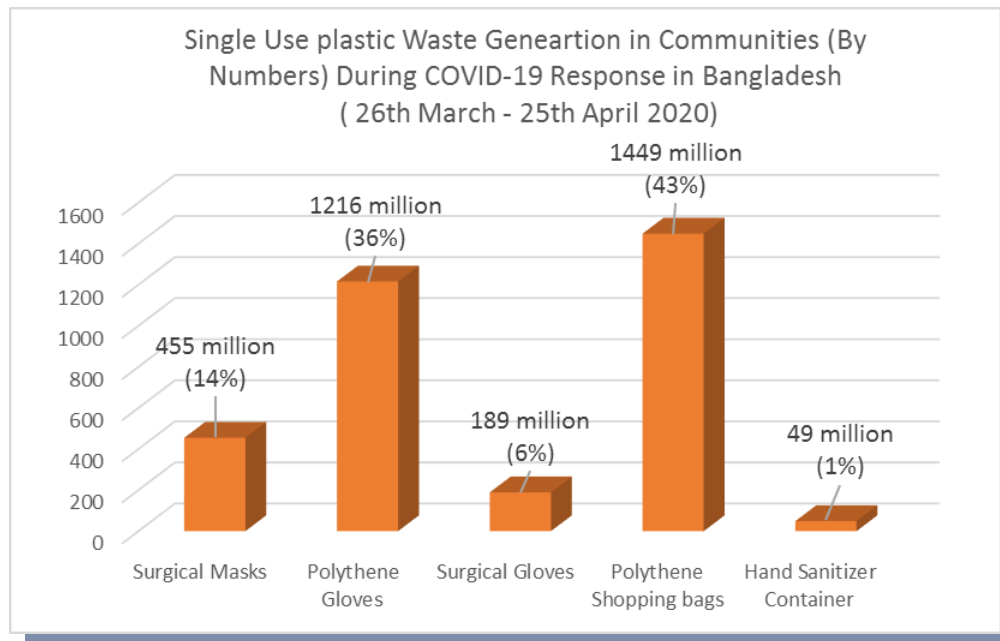


Table-2: SUP waste by number

Single Use Plastic waste Generation (Surgical Masks and Gloves) from Health care Facilities in Bangladesh (26th March - 25th April 2020)

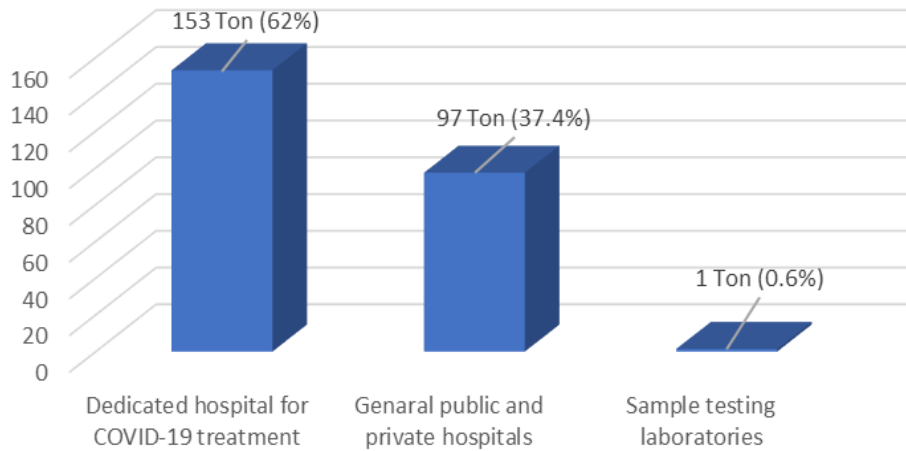


Table-3: SUP waste- Surgical masks and hand gloves (From Hospitals and Medical Centers)

Single Use Plastic Waste Generation in Dhaka during 26 March-25 April, 2020

Single Use plastic Waste Generation (by Weight) in Communities in Dhaka During COVID-19 Response (26th March - 25th April 2020)

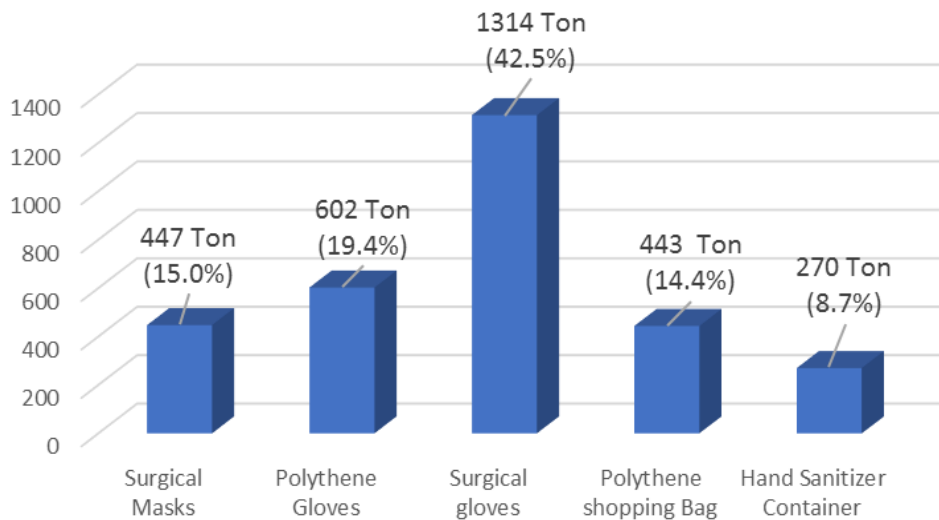


Table-4: SUP waste- generation by weight in Dhaka

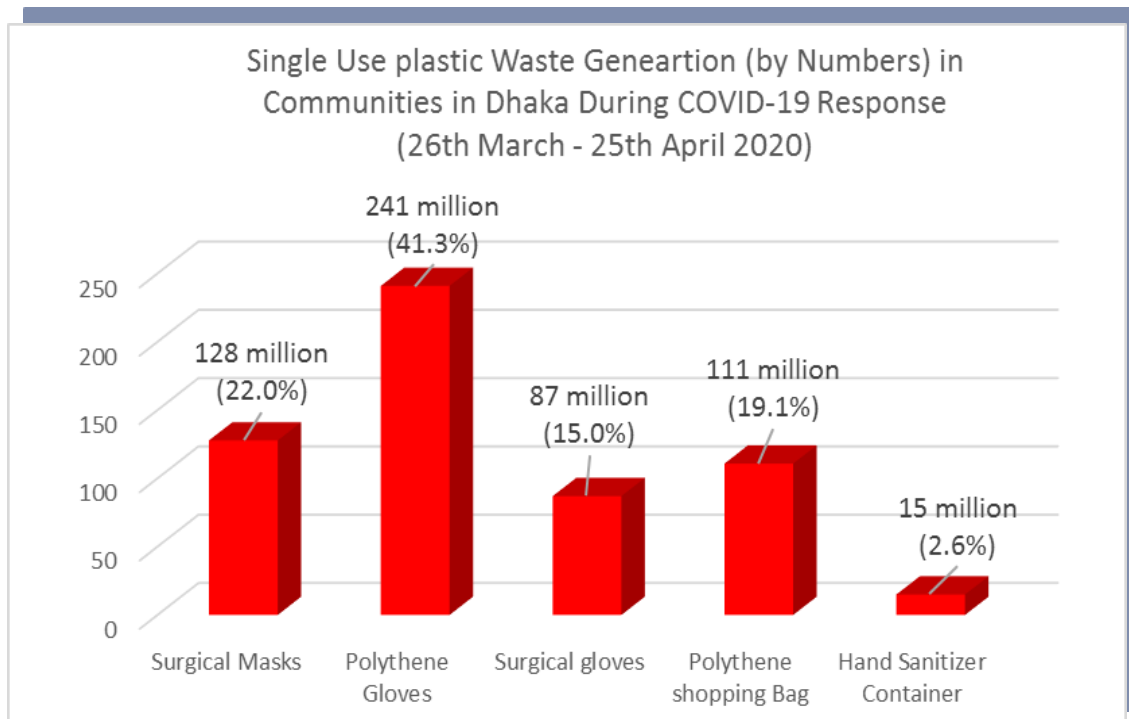


Table-5: SUP waste- generation by numbers in Dhaka

Comparative Hazardous/infected single use plastic waste waste generation

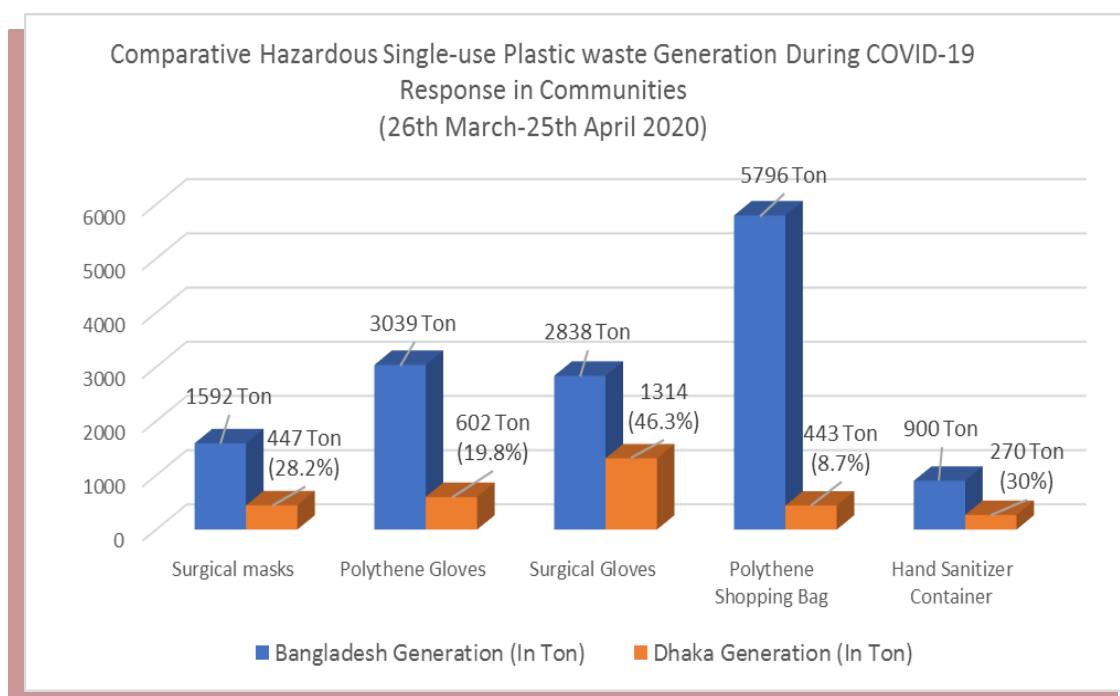


Table-6: Comparative SUP waste generation

Health Risk Associated with Hazardous Plastic Waste collection and management during COVID-19 Response:

The outbreak of COVID-19 has resulted into massive surge in infectious and hazardous waste generation, a great portion of which are plastics or to be precise, single use plastics. The huge demand for disposable personal protective equipment and medical instruments, such as single-use hand gloves, surgical masks and empty IV bags in the wake of the pandemic, has created a deluge of hazardous medical waste. There's more to worry about than just the wastes emerged from medical facilities. The disease has already spread out beyond hospitals. Some people who have minor symptoms are recovering at home. Others who are asymptomatic might not know that the trash they're throwing out could be contaminated. The home garbage put out by both sick and asymptomatic individuals in communities may contain infected masks, gloves or polythene shopping bags. Thus, people are generating plenty of potentially virus-laden trash on regular basis. The main groups at risk in contracting virus from these hazardous plastic wastes generated in households include - workers engaged in cleanup operations and at waste disposal facilities, workers in support services such as laundry, waste handling and transportation and scavengers.

Generically, single-use disposables can harbor viruses and pathogenic bacteria. They are subject to whatever pathogens have settled on them from manufacture, transport, inventory stocking, and eventual use. Single use plastic is also a proven long-term carrier of the COVID-19 virus. Recently a research report published in the New England Journal of Medicine, described the stability of the novel coronavirus, SARS-CoV-2. The report said the virus can remain stable for about four hours on copper, up to 24 hours on cardboard, and for 72 hours on plastic and stainless steel¹. Several other studies have suggested that, the COVID-19 virus can survive from 3 days up to five days upon plastic surfaces which is longer than any other surface materials.

Waste collectors or sanitation workers get directly exposed to hazardous plastic wastes during collection, handling and transportation of infectious wastes from sources to storage facilities. Discarded masks, gloves and other PPE could be potential sources for the spread of this highly contagious virus. When the discarded plastic wastes or garbage bags carrying virus upon them are collected or handled by waste collectors or personnel in waste management facilities without

¹ <https://hub.jhu.edu/2020/03/20/sars-cov-2-survive-on-surfaces/>

proper precautionary measures, it may also get them infected. As the virus can survive and remain active up to several days on plastic surfaces, any other person in the waste disposal facilities who gets in contact with a contaminated plastic surface within this time period will get immediately infected. However, over the course of each workday, the waste collectors visit thousands of homes, businesses and hospitals and if they get infected, they may spread it among fellow employees, or also along the entire route they visited.



Figure: Informal waste collectors in Dhaka are continuing their service in the wake of the COVID-19 pandemic without adequate protection risking their health and safety

Informal waste collectors in Dhaka city are at great risk of COVID-19 infection. Dhaka city comprises of around 5 million households contained in nearly 0.26 million holdings unevenly distributed in 129 wards under Dhaka North and South City Corporations. Existing municipal waste collection mechanism in Dhaka suggests door-to-door collection of household waste in traditional waste carrying vehicles or rickshaw vans by informally employed workers. A standard informal waste picking vehicle (rickshaw van) collects waste from an average 100 holdings daily. Each of the vehicle comes with a minimum two informal workers – one driving the van and another serving as a helping hand in the collection process. Besides that, there persists a temporary waste disposal and storage point in each of the ward where an average 7 to 8 informal workers are involved in waste handling and sorting. As per these considerations, an estimated 6000 plus informal waste collectors are associated with the municipal waste collection and management process alone in Dhaka. However, empirical evidences suggest that, during the COVID-19 response phase, the number of operational waste collectors or waste handling workers has reduced to about 50% in Dhaka. Out of those who are still working, many are getting frequently sick and are being replaced by new ones. Their physical illness may be attributed, to some extent, to their frequent

contraction with hazardous and infectious substances. Besides, nearly 100,000 waste pickers work in Dhaka alone. It employs women and children and wastes picking children in Dhaka is popularly known as 'tokai'. But after the coronavirus outbreak, most of them are absent from the work or self-withdrawal from this work due to lockdown. Around 40 thousand informal wastes collectors/workers are continuing to collect waste from the doorsteps of 61 district town in Bangladesh and the Capital Dhaka. Around 6000 workers are in the Dhaka city at high risk; no one bothers of their health-safety at all. According to them more than 1500 hundred have reportedly got sick and are staying at temporary shelters in the city or left for home village.

Informal municipal waste collectors of Dhaka are rendering important services during the ongoing crisis situation. Considering the health threats posed by infectious wastes, the waste collectors and waste management workers in waste disposal facilities should be equipped with necessary personal protective equipment including masks, hand gloves and PPE. However, the informal waste collectors in Dhaka are working without adequate protection with heightened risk of getting infection from hazardous wastes. Local government or municipal intervention in ensuring the health safety of this informal labor group is still minimal to non-existent. Also, no municipal surveillance workers were found to be actively working for the specialized management of hazardous waste generated during COVID-19 response. The authorities should take immediate action to provide necessitated protection to these informal waste pickers in view of the greater public health interests.

According to the public health expert, cleanliness and personal hygiene have no alternative to the prevention of coronavirus disease. So, it's very important to give more attention to the protection of the waste collector and all workers related to clean up in communities. Considering the health threats posed by infectious wastes, the waste collectors and waste management workers in waste disposal facilities should be equipped with necessary personal protective equipment including masks, hand gloves and PPE. The authorities should take immediate action to provide necessary protection to informal waste pickers in view of the greater public health interests.

Environmental Impacts of COVID-19 generated hazardous Plastic Waste:

Improper disposal of hazardous COVID-19 plastic waste can cause massive pollution of environmental components including soil, water and air. Medical waste is particularly difficult to handle as it is a mix of both wet and dry waste, is highly contagious. When a high volume of medical wastes gets generated within short time interval it becomes often impossible to segregate the waste and treat them before sending them to landfill or to incinerate. When infectious hazardous wastes are directly dumped into landfills, soil contamination occurs. These chemicals are absorbed by plants which are later utilized by other organisms including humans which as a result can cause disease or even death. The infectious substances may get mixed with the soil and rainwater and ultimately get carried away to waterbodies and groundwater as toxic leachates. Improper waste disposal can also interfere with the food supply as plant growth is impaired reducing the amount of food produced.

Incinerating waste also causes problems, because plastics tend to produce toxic substances, such as dioxins, when they are burnt. As bulk quantity of highly contagious medical waste (a great majority of which are plastics) are incinerated in normal incineration facilities, it causes the release of highly toxic gases, fumes, heavy metals and contagious airborne substances as well severely affecting the nearby air quality. Gases from incineration may cause air pollution and contribute to acid rain, while the ash from incinerators may contain heavy metals and other toxins². Because of these problems there are active campaigns against waste incineration.

The improper disposal of infectious waste may adversely impact wildlife. The animals cannot distinguish between edible and nonedible items and they often tend to consume the trash, laden with contagious plastics resulting in their deaths. Fish, seals, turtles, whales and other aquatic species in the ocean also mistake plastic fragments to be their foods and try to consume them. Due to ingestion of trash or plastics, starvation is usually the next step because some species do not have high acidic levels in their stomach to break down the object that they ingested.

Plastic fragments have been known to be able to last for more than 100 years. When it comes to biodiversity, our waste problem is severely plaguing the health of the world's species³.

² <https://www.greenchoices.org/green-living/waste-recycling/environmental-impacts>

³ <https://www.earthday.org/how-our-trash-impacts-the-environment/>

Hand Gloves can harm food chain:

Most of the hand gloves using by the general public are made of polyvinyl chloride (PVC). This type of chemicals knows to leach into food, particularly into fatty food like meats, oily, upon contact. So if this kind of gloves or related protective and infected materials mix-up with household particularly kitchen waste can be leached and if the waste contact to the natural food chain it will harm the system. A recent study found that “one out of seven vinyl or PVC food service gloves tested contained toxic phthalates.”⁴

Table: Major effects of contaminated single use plastics products

Major Effects of contaminated masks, gloves, polybags, and others related Single-Use plastics:

1. Surface water and ground water contamination
2. Soil contamination
3. Incises toxicity on the food chain
4. Direct and indirect viral diseases transition
5. Adverse impact upon human, plants, fishes and birds.
6. Adverse impact upon wildlife
7. Effect upon domestic animals.
8. Epidemics of unlike viral infections
9. Social and economic costs associated with the above-mentioned impacts.

Why Incineration might not be a permanent solution to the Hazardous COVID-19 Waste Problem?

For decades, incineration was the method of choice for the treatment of infectious wastes. But incineration method is too much harmful for our environment as well as for human health. Incineration releases a wide variety of pollutants depending on the composition of the waste, which leads to health deterioration and environmental degradation. Mechanic incinerators at the incineration facilities operate at 850°C in the primary chamber and up to 1,200°C in the secondary chamber. This not only kills the viruses contained in the waste but also generate toxic emissions that create an adverse impact on human health and environment.

⁴ <https://www.toxicfreefood.org/wp-content/uploads/2019/07/Glove-Top-Findings-FINAL.pdf>

Emissions from an Incinerator

In Incineration facilities, the incineration process produces two types of ash. Bottom ash comes from the furnace and is mixed with slag, while fly ash comes from the stack and contains components that are more hazardous. In municipal waste incinerators, bottom ash is approximately 10% by volume and approximately 20 to 35% by weight of the solid waste input. Fly ash quantities are much lower, generally only a few percent of input. Emissions from incinerators can include heavy metals, dioxins and furans, which may be present in the waste gases, water or ash. Plastic and metals are the major source of the calorific value of the waste.

Table: Health impacts of Incineration

Incinerator pollutant	health impacts
Particulate matter PM10 (the smaller the more dangerous) > Ultrafine and nanoparticles	Asthma, decrease lung function, premature death for people with heart or lung disease, heart attacks, coughing, difficulty breathing > Enter lung membrane and bloodstream to brain à brain cancer
Carbon monoxide	Headache, dizziness, heart disease
Hydrogen chloride	Chronic bronchial inflammation, changes in pulmonary function
Arsenic	Lung and throat irritation, skin effects
Cadmium	COPD, kidney damage, possible lung cancer
Chromium (Hexavalent)	Lung cancer, kidney and liver damage
Mercury (Inorganic)	Effects on central nervous system
Lead	High blood pressure, heart and kidney disease, abdominal pain, depression; lower IQ and delayed learning for children
Polyaromatic hydrocarbons (PAHs)	Increased risk of skin, lung, bladder and gastrointestinal cancers; kidney and liver damage

Recommendations:

The most important guidance during COVID-19 regarding the provision of solid waste service includes following provisions:

- Waste management operations and services shall not be disrupted in order not to create additional pressure on public health and hygiene.
- Medical waste from hospitals and other health-related institutions has to be collected, stored, transported, treated and disposed of without any further infection and pollution risks. On-site treatment/disposal is preferred in order to minimize transport risks.
- The risk of a significant number of waste pickers or waste management employees being unable to work might result in a new type of operational challenge. It is recommended that staffs involved in handling potentially infectious solid waste shall be equipped with personal protective equipment (PPE) used for medical waste handling. Waste workers (especially collection workers) should take occupational health and safety precautions to avoid any possible infections by waste streams / equipment.
- The public shall be informed on specific guidance for waste collection in infected households and the provision of infectious waste management services in general.
- Every household and individual should responsible to follow instruction by the govt. or municipal authorities. All waste that has been in contact with any self-isolated individual should be double-bagged or covered bin and tied to prevent the spread of the coronavirus or any infectious substances with single use plastics.

Conclusion:

The CORONA VIRUS pandemic has adversely affected the whole global economy and disrupted the waste, plastic, and recycling industries. At first glance, plastics production, and recycling sectors appear linked to essential services only during waste management, but in reality, they are intimately connected to a thriving economy and critical public health roles. Significant limitations on recycling and municipal waste services have been caused due to the uncertainties associated with the COVID-19 pandemic.

The COVID 19 pandemic is spreading continuously and for that reason its adverse impact on human health and environment is increasing day by day. Government is urged to treat waste management which includes of medical, household and other hazardous waste as an urgent and essential public service in order to minimize possible secondary impacts upon health and the environment. Infectious or hazardous wastes are needed to be segregated and disposed following standard methods in order to minimize their associated impacts. Effective management of biomedical and health-care waste requires appropriate identification, collection, separation, storage, transportation, treatment and disposal, as well as important associated aspects including disinfection, personnel protection and training.

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info@esdo.org