

# Neighborhood Safety Measures in the wake of COVID-19 for home quarantine waste generation in India

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**Abstract** - The novel coronavirus (2019-nCoV) emerged in Wuhan, China in December 2019 which had put the entire world under the threat of COVID-19, a form of respiratory and systemic zoonosis [1], [2]. COVID-19 does not have therapeutics or vaccines as of now [3] until then relying on classic public health measures is the only way. The paper is exploring the home quarantine waste management, in the lockdown and post lockdown period of the individuals put on home quarantine. The lockdown measures ensure containment of viruses and also includes home quarantine measures where suspected individuals are kept under observation in isolation at their homes. Social distancing and lockdown are some of the important measures, that the countries took to control the pandemic, resulting in the closure of schools, work from home options, cancellation of public gatherings, etc. [4]. The waste generated from home quarantine needs special care with urgent safe disposal, in a planned way to avoid the spread of the virus. The safe handling of waste, from generation to final disposal level is to be looked at situation centric as the areas under quarantine are different in terms of density, population characteristics[5], etc from one to another.

**Index terms** - COVID-19, Home quarantine waste, Lockdown, Social distancing, Waste disposal.

## 1 INTRODUCTION

ON January 2020, WHO (World Health Organization), declared coronavirus COVID-19 as an emergency to the public health of international concern. There is no medicine or vaccine for the disease and till then relying on classic public health measures is the only way [6]. The isolation is one of the measures which are usually adopted in hospital settings with rooms having negative pressure reducing aerosol transmission of droplets. The other methods adopted since the quarantine can be applied to an individual or a group at home or a designated facility. As there is no drug, the medical staff and systems are overburdened non-coercive community interventions will help in the control of the disease which includes social distancing, cancellation of mass gatherings and meetings, closure of mass movement areas such as malls, cinema halls, etc, voluntary home quarantine, cancellation of the marriages parties funeral, and other mass gatherings and information control by putting a check on viral and fake news [7]. The home quarantine will generate waste which requires urgent safe disposal and it demands various public health interventions for waste management. The geographic quarantine strategy calls for containment of viruses from the spread which means the large area or district is enforced with movement restriction of residents [1]. The Social distancing, a part of geographical quarantine, is the other method where the

interactions between individuals, is reduced along with other containment measures of closure of public gathering places [6], [8].

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The Lock-down is one of the measures used in India and elsewhere. The social distancing of 1-2 meters physically and isolation, has a large impact on flattening the curve of the spread of the virus [9]. In the home quarantine, certain measures have to be followed for the safety of the person and other members of the house to avoid the spread of disease to others, WHO-Sri Lanka [10], listed out the following points:

1. Allocation of a well ventilated separate room.
2. Maintain at least 1-meter distance at all times.
3. Separate toilet to be allocated only for the person in quarantine, and if not available

periodical cleaning of premises with soap water of the toilet to be followed.

4. Minimize visitors to the house and follow frequent hand wash for at least 20 seconds.
5. Do not touch the eyes nose or mouth with unwashed hands.
6. Use disposable face masks gloves etc in disposable closed bins (in India, it's advised by Pollution control board to use Yellow bags so that the sanitary worker can recognize the bag [11] ).
7. Separate utensils to be used for the person and the used of linen to be washed in soap water.

## 2 LITERATURE REVIEW

The novel Corona Virus COVID-19 is a respiratory disease, declared by WHO as a pandemic disease [12]. These authors discuss the impacts of social distancing in the event of Lock-Down stating that the psychological and social problems arise out of these measures such as anxiety, panic state due to uncertainty, economic recessions, etc. This paper is a basic guide to understand the implication of social restrictions.

CPCB (Central Pollution Control board) guidelines are provided for safe collection and disposal of home quarantine waste [11]. It states that the local bodies should either directly collect from homes in Yellow bags or identified collection points The solid waste disposal has to be as per the SWM rules. This paper gives guidelines for biowaste. Further deep search needed to find out related to present conditions.

This report by the United Nations report on COVID-19, [13] 'Shared responsibility and Global Solidarity' on COVID-19 states the impacts and guidelines for the protection and future of the economic measures to protect the globe. It's useful in getting to know the impacts of COVID-19 on the global economy, employment, etc. The neighborhood-level interventions are not part of this.

This paper by Ebrahim et al (2020), goes in detail into the masks PPEs and other distancing measures suggested for the control of the

pandemic application, though it doesn't specifically focus on neighborhood facilities, it's very resourceful in the measures being taken such as social distancing closure of mass gatherings closure of schools, malls, and public places is the only solution to control of the pandemic till drugs are made and available [7].

The author Dharmshaktu [14] identifies the problems that differ from western to Indian countries by way of religious practices and geographical locations, non-preference of readymade food, etc habits that are beneficial in the control of the spread as well as religious gatherings pose problems of spread. This paper takes note of Indian situations.

Kumar, Vijay, and Pandit, R K (2013) [15], take note of the problems of Indian solid waste management as they point out the probable methods and remedies for proper collection and disposal of solid waste. This paper is useful to understand the properties of Indian waste and practices. This specifically does not mention COVID-19 but a guide to understanding the basics. There is a need to find out the strategies for the lockdown and post lockdown home quarantine waste disposal safety and area centric methods suitable for India

## 3 THE INDIAN CONTEXT

In the home, quarantine front the PCB and other organizations laid out some guidelines nationwide and some of the state PCBs ( Pollution Control Board) also set up guidelines based on central PCB add few more points to the WHO guidelines such as staying away from elderly people, pregnant women, children, and persons with co-morbidities within the household. Wear a surgical mask at all times. Change the mask every 6-8 hours, and disposed of, never reuse the mask. Masks used by the COVID-19 patients, their caretakers, and close contacts during home care should be disinfected using ordinary bleach solution (5%) or sodium hypochlorite solution (1%) solution. The used masks gloves and other items to be disposed of either by burning or deep burial [16].

The waste disposal methods were listed out by the author Chandran (2020), in his

statement on the PCB rules of the state Karnataka such as in case of apartments where the sanitary worker is delayed or not available, the PPEs (Personal Protective Equipment ) to be separated from the sanitary waste and the composting can be done in case of delay in the collection by the staff. Compulsory separation by 2 bin one bag method is recommended [17]. The safety precautions regarding the disposal of the PPE, napkins, and other types of infected materials need special focus as this is may spread the virus if disposed of incorrectly. Das (2002) in his Surat city case study finds out that there is considerable morbidity among the door to door solid waste collectors due to exposure to physical-chemical and biological toxins. Manual segregation methods pose further problems in it [18]. In the wake of the COVID-19 situation, the problems further escalate, if proper training and knowledge on the behavior of virus are not given to the workers on the possibility of further dangers of virus spread, because of the improperly disposed of PPEs, tissues, and other home quarantine waste, used by the persons affected.

There are few problems in the Indian part of the disposal methods at the neighborhood level, as we often find lack of approach to the waste disposal bins and the garbage is thrown all over ( Fig: 1). There is also the problem of stray animals such as dogs, cattle, etc being infected with these improper waste disposal methods. Solid waste management in India is inefficient as the persons involved are not equipped with PPEs and the lack of a formally organized system for biodegradable solid waste is one problem, where segregation of biodegradable waste its and recovery and recycling is done [15]. The possibilities of viral infections are found from the scrap dealers and scavengers who segregate the waste manually under unhygienic conditions without proper protective gear. Monitoring at this stage is difficult, but the persons have to be educated on the precautions required separately for the COVID-19 viruses. In the domestic quarantine waste, as a study says the existence of a virus is detectable for some time on surfaces, aerosols, and stool [15]. The urban slums lack solid waste collection and the

areas are narrow and sometimes difficult to approach. The residents, youth groups, and/or organized cartels often fill the gap of the staff, and since the entire area is under lockdown, the quantity of waste generation will be more as compared to the disposal areas available, especially when more infected persons are in quarantine [15]. Due to narrow lanes, high densities, water loggings, and lack of proper facilities in these areas make social distancing a difficult task. The level of education and habits make a huge difference in the vulnerability of the spread, and if these residents are well informed of the ill effects of the virus and safety measures, the disposal methods the dangers will be less.

During the H1N1 Influenza pandemic in 2009, it is noticed that large density areas have more impact of spread as compared to rural areas [1]. The physical design and social interaction can thus best be balanced primarily at the neighborhood level [19], which plays an important role in addressing waste disposal problems. The traditional spaces are organic, compact with high density, developing into a wide range of shapes responding to site constraints and economic status [20]. These spaces and are not easily approachable due to their organic pattern where the control of epidemics becomes difficult to handle and the sanitization measures are improper. As per PCB trained and authorized staff having full protective gear, are to collect the waste from quarantined homes for proper disposal naming them “essential services”. Considering that, there may be a generation of a large volume of yellow color-coded (incinerable) Covid-19 waste, the CPCB has directed states, without a bio-medical treatment facility can dispose of in hazardous waste with due segregation [21].

#### **4 NEIGHBORHOOD PLANNING- HANDLING OF THE WASTE**

The neighborhood planning is accepted as a tool for urban planning across the globe in one form or the other ever since Perry pioneered the idea of the neighborhood [22]. The neighborhoods are the self-contained places rather than just

houses with related facilities [23] sharing their entities with improved mental and physical abilities, with specific boundaries. The planned neighborhoods act as a barrier to infections, because the facilities located for the designated area, in a way, will encourage orderly growth of the unit [23]. Thus the infections may be restricted to a particular neighborhood, rather than spreading to other areas. As compared to unplanned developments the Neighborhoods are better places and the safety measures can be easily applied as the areas are better organized and the residents can be easily approachable. The safe disposal of waste in the quarantine areas of neighborhoods concerning used PPEs and the other waste is easier there will be designated places for facilities including solid waste areas. COVID-19 affects people in different ways like the socio-economic status, population density urban-rural settings, educational status, size of the households, and block distances [24]. The socio-cultural aspects and the religious aspects also play some role in the spread of viruses, for example, Indians prefer home-cooked food over outside food, the habit of Namaste instead of shaking hands, and lesser preference of ready-cooked food, etc [14].

There are certain problems in the handling of waste in Indian cities, as [25] points out, that one can smell the garbage while passing by the local garbage bin due to the improper way of dumping the waste. (Fig: 3), shows the way the dust bins are used as the area is unapproachable the waste is scattered all over which will be hazardous since the stray animals tend to aggravate the situation further. The leachate at the dump ( Fig:4 ), isn't properly treated and is left to the water body. These situations are more hazardous in the case of COVID-19 waste where the virus can find new ways of spreading and also a threat to the lives of the sanitary workers. In the wake of COVID-19 where the virus can stay on surfaces for quite some time and can spread when the waste handlers touch the surfaces. The virus-laden droplets stay for quite some time on surfaces such as objects that were frequently touched such as computer mouse, followed by trash cans, handrails, and doorknobs

[26]. The time that it takes before it dies is high risk if the waste is not disposed of properly. It's suggested to perform hand hygiene practices immediately after touching the surfaces, whereas the waste picker doesn't know whether the waste has been infected with a virus or not. Some people are at higher risk of adverse effects, of the waste, including cleaners, trash collectors people who spend a great amount of time in public places [24]. As the experts pointed out the virus can not be eradicated but we need to live with it till we find proper medication for it. As the Chief Minister of Andhra Pradesh state and other ministers rightly pointed out that we have to live with the virus as no one can completely eradicate in the present situation but proper measures can provide some protection from the virus. With the means the technology, we can find an easier way to identify the pattern of movements in a given neighborhood.

## 5 SAFE DISPOSAL METHODS

The wastes generated as discussed above need to follow some measures to avoid the further spread of the virus. The following interventions are suggested for the safe disposal of quarantine waste:

1. The awareness of the type of disposal methods at the household level has to be well advocated during quarantine to the individuals and the general public using print media and other social media.
2. The waste composition and the method of usage and disposal of the used PPEs are to be instructed at the household level.
3. The use of a particular 2 bag system with the yellow bag for the COVID19 waste as prescribed by PCB has to reach the end producer of the waste.
4. The proper maintenance of dust bins with a special provision of bins for COVID-19 waste is to be added to existing neighborhood-level dumps.
5. The PPEs have to be mandatory for the trash collectors and the community wash areas are to be provided at open spaces parks and existing public conveniences.

6. The sanitary workers are to be educated with a special focus on the spread of viruses and personal hygiene.
7. Proper guarding of dust bins needed to protect from stray animals to enter the areas.
8. Neighborhood and 'Mohalla' level collector vehicles are to be well guarded against a spillover of garbage during the transport to dumps.
9. All neighborhoods are to be equipped with CCTV and other data-driven modes to monitor the social interactions and future recording of household movement.
10. Existing healthcare facilities are to be equipped with isolation rooms and if needed ventilators and other facilities in the neighborhood clinics.
11. The sufficient stock of PPEs is to be made available in the health center for the medical and supporting staff, and also for the municipal workers such as garbage collectors.
12. The app-based approaches are suggested with the residents under quarantine will be monitored for their supply of medicines PPE's daily needs and especially waste collection and disposal. The collection and disposal of wastes from these households can be monitored.
13. The red-orange and green zones classified by GOI for lockdown relaxation strategy (India today, 2020) are vulnerable for future quarantines if needed and the waste disposal safety is much more challenging as the social movements have started and the people to material contact has already started.
14. In the post lockdown relaxation period the waste disposal norms have to be the same as that were in the red zone areas and the monitoring has to continue.
15. The sanitization of areas especially the garbage dumps has to be frequent to ensure the virus spread is minimized.
16. The stray animal entry to garbage areas to be strictly avoided as an animal to human contact may arise.
17. There should be separate closed bins for the COVID-19 waste so that the disposal continues on a fast track basis by providing a special disposal vehicle.

18. The database (Arogya Sethu [28] app, etc), to be continued by tracking the individual status and provided authentic information (Sankaranarayanan, 2020) and required steps for quarantine if needed in future after lockdown relaxation also. The app can be further strengthened for future uses at neighborhood level health concerns.

19. The provision of close circuit TV at these places till COVID-19 is controlled will be useful to monitor the waste management and sanitize the area.

20. The disposal sites are to be checked for spillover of waste while transporting and leachate management so that it won't contaminate the local water bodies.

## 6 DISCUSSION

The Home quarantine method is very successful in containing the outbreak of COVID-19 which WHO has declared as a global Public Health emergency [8]. The waste generated by the home quarantine is very hazardous and the collection and disposal method is challenging since the very nature of the virus is alarming. The virus is detectable on various surfaces, aerosols, etc for quite a long time [26] which makes it further difficult to dispose of and the places touched by the patient will be difficult to ascertain. The person's in-home quarantine has to be well informed of disposal methods for which the PCB has made some guidelines for using yellow-colored bins and disposed of or collected by the Municipal staff. The provision of the separate bin at collection points also will be helpful in the quick disposal of the waste to the sites. Existing set up of disposal methods and collection points at the local level needs further precautions of close monitoring stoppage of stray animal entry to the areas and provision of PPEs for the staff working on the waste disposal. The app-based data monitoring of home quarantine families and the use of technology such as CCTV monitoring of the neighborhoods will benefit in reducing human contact and monitoring the situation in case of mishaps. This data and mapping can be useful in utilizing not only home

quarantine but other social interaction needs of the neighborhood and is a tool for understanding the workability of the community-based public health programs [30]. In addition to the usual way of summarizing the demographic characteristics of communities, and the neighborhood physical characteristics using maps, Map Info, Arc GIS and Epi Map, can be useful tools for better identification sections of a target area at increased risk can be controlled for safety and management of population residing within it. The facilities of health care need to be looked at by strengthening the existing health center with more technological advances and availability of more isolation ward in the health centers and better equipment such as PPEs, etc in the neighborhood level, benefit in easy control of the sudden outbreak of viruses [31]. Although they are not used regularly, they can be useful in our preparedness for future epidemics of this sort. The provisions for safe disposal of waste need the special focus of educating the people of the ill effects of mishandling of the waste at all levels. Social distancing and isolation areas, more movement spaces around the facilities. The convenient shopping also to be encouraged for reducing footfall by encouraging app-based home delivery of the daily needs grocery etc. Payments will also benefit in tracking the movement of people, as well as the control of the neighborhood will be easier. Adequate social distancing and sanitation measures to be added at open spaces. Open green spaces provide a natural environment benefitting the health improvements of the inmates, as well as the healthy social interaction of all ages [32]. The conventional areas where organic growth is evident have to be dealt with by easing the compactness and adding the benefits of neighborhood planning wherever possible, by the use of monitoring of the area by data-driven technologies.

## 7 CONCLUSION

The lessons learned from the COVID-19 are going to last long and the safe disposal methods have to be further strengthened as per the needs of the local areas. The PPEs to be made

available at all levels including people in quarantine and the staff handling the waste. Spillage of waste has to be checked at all stages of generation to disposal. There is an urgent need for more situation centric studies on the waste disposal methods and the safety measures required for at-home quarantine and neighborhood levels. The virus properties its spreading pattern is to be kept in mind such as how long its presence is found on different surfaces and what are the sanitation measures required for the containment of the virus.

The density aspect has to be re-looked into, to allow social distancing and other measures in the cases of control of other communicable diseases. The use of better technology in reducing human interventions in the waste disposal with more technological advancement, better equipment, better mapping of residential areas with monitoring and other measures will benefit further. The pattern of some of the existing settlements, slums triggers alarm bells as these are areas with (UN-Habitat, n.d.), low interventions of proper planning which are vulnerable to these outbreaks of epidemics. The safe disposal of quarantine waste should not be overlooked since the dangers of spread will be more in a situation of mishandling of waste.



Figure 1 Garbage bin - Improper disposal [34], PP:1



Figure 2 Leachate [34], PP: 2

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