

THE QUANTIFICATION OF DISPOSABLE MASKS POLLUTION WORLDWIDE

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Abstract

The use of disposable masks became an essential daily protection item against the spread of COVID-19 globally. This research is interested in evaluating the impact of disposable masks on the environment by continent. We try to determine how much pollution can generate disposable masks worldwide. Hence, the increment in disposable masks' uses can cause high pollution of rivers, lakes, seas, and oceans, respectively. Meanwhile, in this research, we can confirm that disposable masks' pollution is irretrievable (fauna and ecological) can generate more damage than COVID-19. Finally, this research supports alternative types of masks with low environmental cost, easy to clean, and safety.

Keywords: COVID-19, Transmission, Mask, Controls, Eradication

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1. Introduction

The use of disposable masks among us to protect from COVID-19 became part of our daily life worldwide. The consumption (demand) of disposable masks grows from 2018 (5%) to 2020 (350%), according to WHO (2020). Hence, the production and exports of disposable masks grew from 2018 (3%) to 2020 (500%) according to different reports from large producers. The massive production (supply) and consumption of disposable masks increase exponentially. Hence, we can observe from March 2020 is possible to follow the enormous use of disposable masks worldwide. The usefulness of disposables masks use by continent shows the next results follow by Asia (99%), Americas (65%), Europe (85%), Africa (55%), and Oceania (40%).

We can observe that Asia, almost the entire population, uses disposable masks; the main reason is that in Asia exist the culture and habit of using masks in flu and cold. Significantly, in North-East Asia, such as Japan, Korea, Taiwan, Hong Kong, and China. Moreover, in South East Asia, such as Malaysia, Singapore, Thailand, Vietnam, Indonesia, Laos, Cambodia, and the Philippines. The South East uses of disposable masks are minimum compare to East Europe. For South Asia, such as India, Pakistan, Nepal, Bangladesh, disposable masks are inexistent according to statistics from the world health organization.

According to preliminary data, disposable masks in Europe were inexistent, and they started to use it was late. The damage of COVID-19 among the large countries in Europe, such as Spain, Italy, Germany, France, Russia, and the United Kingdom, shows the number of COVID-19 cases exponentially. The missing of disposables masks just at the time against the COVID-19 was late. The number of cases increases (100% daily) in large cities until the COVID-19 shows a chaotic panorama.

The use of disposable masks in Americas relatively only a small part of the population uses it. The late benefits of this essential health protection item, especially in the United States, Argentina, Chile, Brazil, and Ecuador, bring several impacts on the faster expansion of COVID-19 unstoppable and costly. The use of disposable masks in the United States became a racial and political division between different social groups until they arrived in a severe racial issue with unimaginable social and economic dimensions.

For Oceania (Australia, New Zealand, and the pacific islands), disposable masks have some socio-economic repercussions, especially in Australia. These disposable masks involve discrimination and racism against Asians in large cities that generate international tensions, especially with China. The misunderstanding in the uses of disposable masks forces the government to propose new measures on its usefulness.

Finally, the use of disposable masks in Africa shows fewer benefits than any continent in mention. The main reasons for the minimum uses of disposable masks have their origins from the massive poverty and insufficient knowledge about its use. We can observe that the use of disposable masks worldwide involves cultural, understanding, learning issues. North-East Asia

is considered the pioneers and leaders worldwide in the benefits and recycling of disposable masks. The adaptation in disposable masks took time in the COVID-19 crisis for many continents, especially in vulnerable economic groups with low income and education levels.

2. The Impact of Disposable Masks Pollution in the Environment

This research focuses on the impact of disposable masks in the generation of pollution worldwide. According to our preliminary experimental results, the pollution of disposable masks is enormous and costly. The pollution of disposable masks in the period of COVID-19 directly impacts the water pollution levels (rivers, lakes, canals, seas, and oceans). The level of disposable masks pollution ($\dot{M}$) calculation is equal to the total of disposable masks uses daily (U) minus the disposable masks recycled daily (collection and full or partial destruction of the masks ecologically - R -) divided into the total population (P). Subsequently, we multiply the last result from our calculation by a hundred percent (100%). We assume that nineteen percent of disposable masks pollution is thrown away in rivers, canals, lakes, seas, and oceans.

$$\dot{M} = U - R / P \times 100\% \quad (1)$$

Subsequently, we proceed to calculate the level of disposable masks' marginal pollution rate ($\dot{M}'$) follows the first differentiation between the present status of disposable masks pollution ($\dot{M}_{t+1}$) and the past level of disposable masks pollution ($\dot{M}_{t-1}$) (see Expression 2).

$$\dot{M}' = \partial \dot{M}_{t+1} / \partial \dot{M}_{t-1} \quad (2)$$

The next step is to find the critical point of the level of disposable masks pollution rate ($\dot{M}''$) under the second derivative's application, according to Expression 3.

$$\dot{M}'' = \partial^2 \dot{M}_{t+1} / \partial^2 \dot{M}_{t-1} \quad (3)$$

We assume this new indicator applies the Omnia Mobilis assumption (Ruiz Estrada 2011) and (Ruiz Estrada, 2018). Simultaneously, we use the dynamic imbalance state (Ruiz Estrada and Yap, 2013). The application of the disposable masks pollution ($\dot{M}$) in the five continents shows these results. See table 1 and figure 1.

Tab.1

The level of disposable masks pollution ($\dot{M}$), the level of disposable masks marginal pollution rate ($\dot{M}'$), and the critical point of the level of disposable masks pollution rate ($\dot{M}''$) per Continent in Year 2020

Asia ($\dot{M} = 35\%$; $\dot{M}' = 59\%$; $\dot{M}'' = 60\%$)

Americas ($\dot{M} = 43\%$; $\dot{M}' = 57\%$; $\dot{M}'' = 78\%$)

Africa ($\dot{M} = 79\%$; $\dot{M}' = 83\%$; $\dot{M}'' = 88\%$)

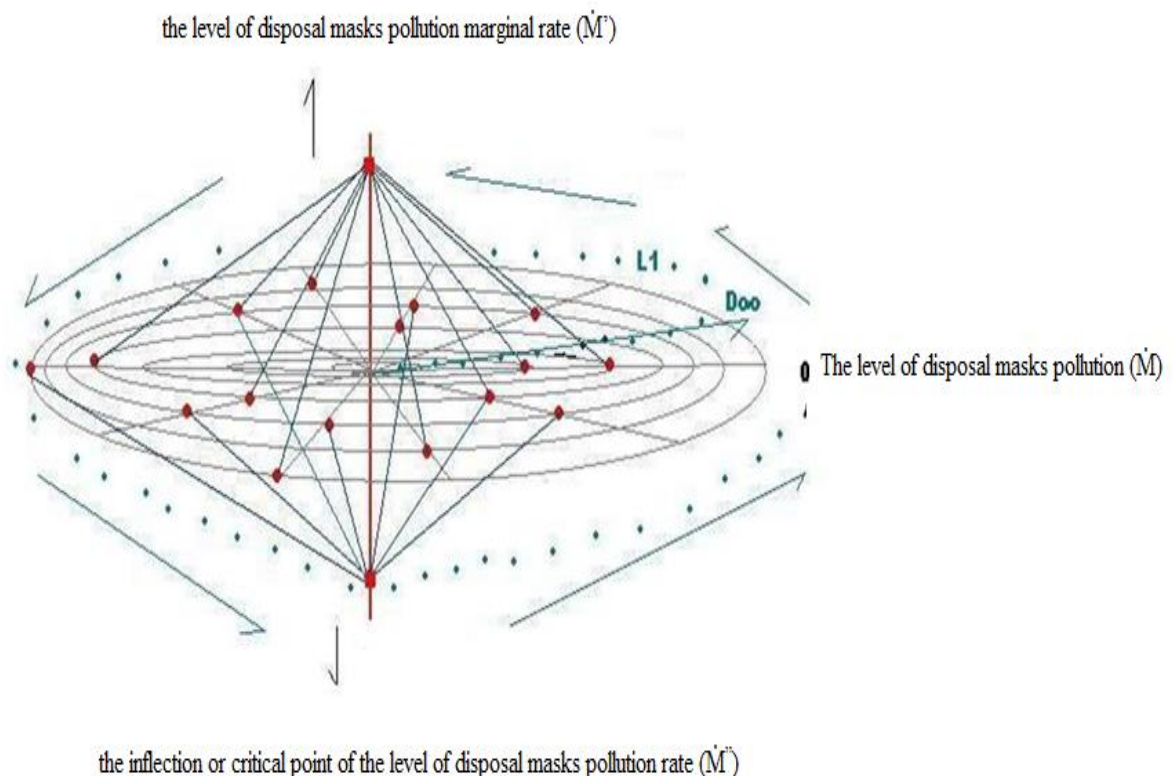
Europe ($\dot{M} = 27\%$; $\dot{M}' = 47\%$; $\dot{M}'' = 58\%$)

Oceania ($\dot{M} = 31\%$; $\dot{M}' = 52\%$; $\dot{M}'' = 67\%$)

Source: WHO (2020) and UN (2020)

Fig.1

The level of disposable masks pollution ($\dot{M}$), the level of disposable masks marginal pollution rate ($\dot{M}'$), and the critical point of the level of disposable masks pollution rate ($\dot{M}''$) per Continent in Year 2020



Source: WHO (2020) and UN (2020)

The final results from table 1 show that is Europe and Oceania shows the lower level of disposable masks pollution ($\dot{M}$) with 27% and 31%. In order in Asia, the Americas, and Africa with a higher disposable masks pollution rate ($\dot{M}$). In the disposable masks, the marginal pollution rate ($\dot{M}'$) presents the results from top to bottom followed by Europe, Oceania, Asia, the Americas, and Africa. The current list can show the real expansion of the disposable masks pollution in different hydro resources such as rivers, lakes, canals, seas, and oceans.

Meanwhile, the inflection or critical point of the level of disposable masks pollution rate ($\dot{M}''$) presents the maximum levels of disposable masks pollution rate ($\dot{M}''$) in different hydro resources in a critical period of one year. If we pass these disposable levels masks pollution, then these continents can experience dangerous water pollution levels for human consumption. According to preliminary results for Asia (60%), the Americas (78%), Africa (88%), Europe (58%), and Oceania (67%). If any of these continents pass these critical levels, they can have environmental chaos and new diseases related to disposable masks' pollution.

3. Conclusion

This paper concludes that the disposable masks pollution can create massive damage in hydro resources worldwide. Maybe the disposable masks pollution can generate more harm than the COVID-19 itself. The reduction or replacement of the disposable masks depends on new materials, designs, and types of masks. The new kind of mask requires a unique aerodynamic design that is easy to clean, protect, cheaper to the public, easy to maintain, and durable to protect us from COVID-19 more efficiently. Moreover, we need more research and development to build a new type of masks. Simultaneously, new mechanisms of recycling models to avoid the masks arrive at our hydro resources on time.

4. References

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