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Research Paper

# Surveying Medical Mask Waste Generation in Can Tho University, Vietnam

Nguyen Thanh Giao[1]*, Nguyen Nhu Y[1], Pham Ngoc Phuong Vy[1]

[1] *College of Environment and Natural Resources, Can Tho University, Can Tho City, 900000, Vietnam*
***Corresponding author e-mail**: ntgiao@ctu.edu.vn

**Abstract**
Medical mask waste is generated more and more and causes many negative impacts on the environment and human health. This study was conducted to survey the current status of using and managing medical mask waste by students at Can Tho University, Vietnam. The study conducted by direct interviews with 120 students and field observations of the research area. As a result, students of Can Tho University use about 43,850 masks resulting in 153.475 kg of medical mask waste per day. Medical mask waste was not well classified by students. Understandings of students regarding toxicity and non-biodegradable characteristics of medical masks are relatively high. However, the level of awareness of students about medical mask waste has some limitations, through the way that medical masks are considered as household waste and are not really necessary to pay attention to the classification of medical masks. As can be seen that training on waste classification and associated waste containers are urgently needed for better solid waste management in the university. This research will contribute to enriching scientific data sources in the field of solid waste, especially medical mask waste.

**Keywords**
Can Tho University, Medical Mask, Student, Waste Classification, Environment

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## 1. INTRODUCTION

Medical masks are commonly used as a physical measure to help limit the infection of respiratory-related diseases, especially during the COVID-19 pandemic, medical masks are more and more preferred. An estimated 289.63 billion masks are used annually in Asian countries (Vietnam alone uses about 61,364,918 masks), and European countries contribute about 61.02 billion masks (Chowdhury et al., 2021), with materials made from different resins, such as polyurethane, polyacrylonitrile, polyester, polyethylene terephthalate and polypropylene (Fadare and Okoffo, 2020; Hasan et al., 2021). In particular, polypropylene plastic is most commonly used in the production of medical masks. However, most plastics are non-biodegradable and take centuries to be fully degraded (Ali et al., 2021). Therefore, they tend to accumulate rather than decompose in landfills and the natural environment (Barnes et al., 2009). In Vietnam, the annual plastic waste generation from N95 masks was about 49,275 tons (Chowdhury et al., 2021). Notably, improperly disposed mask's waste, in the natural environment, will decompose into particles smaller than 5 mm called microplastics, which contribute to environmental pollution (Zambrano-Monserrate et al., 2020; Selvaranjan et al., 2021). Currently, microplastics have been found in almost all environmental components such as surface water, sediment, soil and even in human diet and drinking water (Anik et al., 2021). In addition, the presence of masks has been found in many oceans, beaches and freshwater ecosystems, when aquatic organisms ingest this waste can affect growth and development (Selvaranjan et al., 2021). Meanwhile, mask waste scattered on land can affect terrestrial fauna, causing entanglement, wrapping around people and beaks, leading to death (Selvaranjan et al., 2021). Therefore, it is necessary to pay attention to the management of medical mask waste in the near future.

Can Tho University is located on 3/2 street, Xuan Khanh ward, Ninh Kieu district, Can Tho city with an area of 87 ha. The university is the leading center of training, scientific research and technology transfer in Vietnam, making effective contributions to the cause of training high-quality human resources, fostering talents and developing science for economic and society development of the Mekong Delta in particular and the country in general. Currently, the University is training 98 university majors with 30,446 full-time students, 15,850 students of the working-study program, 9,473 students of the distance learning system and 2,861 other students. Every year, the University also receives a large number of new students. Given the large number of

students, the number of medical masks used and discarded on campus is forecasted to be very large. If this waste is not managed properly, it will lead to many potential environmental and human health risks. Therefore, the study is conducted to survey the current status of use and management of medical mask waste by students at Can Tho University was carried out with the aim of determining (1) Current status of use and emission of medical masks in the student community, (2) Current status of medical mask waste management on campus, (3) Students' awareness and interest in medical mask waste. The results of the study could be used for better management of medical waste in Can Tho University.

## 2. EXPERIMENTAL SECTION

The research was carried out at Zone II of Can Tho University, in which students from four faculties, affiliated schools including Faculty of Environment and Natural Resources (MT), Faculty of Natural Sciences (TN), School of Information and Communication Technology (IT), the School of Economics (KT) was selected for interviewing. At the same time, the campus of the four faculties and schools are the sites of fieldwork. At the time of the study, the number of students from the Faculty of Environment and Natural Resources, Faculty of Natural Sciences, School of Information and Communication Technology, School of Economics are 1,233; 1,029; 3,879 and 5,443 students, respectively. These faculties have a large number of students, and rank first in the number of students in all training units at Can Tho University, resulting in a very large scale of medical mask use.

The process of field survey and interviews with students of the Faculty, the University was conducted from August 1, 2022 to August 14, 2022. The study conducted random interviews with a total of 120 students at four Faculties and School. The interview process was conducted directly, using a detailed questionnaire with 28 questions, including four main contents as follows (1) Information about students being interviewed (2) Current status of use medical masks such as the type of mask used, the frequency of mask changes in a day, the number of masks used in one time, (3) The level of interest and awareness of students about medical mask waste such as the classification of medical mask waste according to the provisions of the law, hazardous and non-biodegradable components of medical masks, the degree of impact of medical mask waste on human health and environment, (4) Current status of medical mask waste management such as classification, collection and proposed solutions. At the same time, combined with the field observation process, surveying around the areas of trash cans, canteens, garages, aisles, where medical masks may appear. Then pictures reflecting the classification status and collection of medical mask waste in the study area were taken. Interview data on the current status of use, interest and awareness of students towards medical mask waste, and the current status of waste management were coded and synthesized using Microsoft Excel software. Descriptive statistics are performed through the calculation of the total value, percentage (%) for qualitative variables.

## 3. RESULTS AND DISCUSSION

### 3.1 Current Status of Using Medical Masks by Students

The results of the survey on the type of mask used by students in the study area are detailed in Figure 1(a). The results show that students of the Faculty of Environment and Natural Resources, Faculty of Natural Sciences and School of Economics mainly use two types of masks: medical masks and medical masks combined with cloth masks, accounting for 76.67% and 23.33%, 93.33% and 6.67%, 86.67% and 13.33%, respectively. Meanwhile, students of the School of Information and Communication Technology use all three types of masks, which are medical masks (accounting for 93.33%), medical masks combined with cloth masks (3.33%) and cloth masks (accounting for 3.3%). Out of a total of 120 interviewed students, 105 students chose to use medical masks (accounting for 87.5%). From there, it can be seen that medical masks are chosen by most students to use. For medical mask material, the interview results showed that the four-layer medical mask was used the most by students (82 students, accounting for 68.33%), followed by three-layer medical masks (29 students, accounting for 24.17%) and the third place is the activated carbon medical mask (7 students, accounting for 5.83%). There are seven specific reasons students believe that medical masks must be used in daily life (Figure 1(b)). Firstly, wearing and using medical masks is highly convenient and almost everyone uses medical masks in daily life even when there is no epidemic (104 students, accounting for 86.67 %). Some students also explained that compared to cloth masks that have to be washed and dried after a few uses, medical masks can be used once and then discarded, which is very convenient. The second reason, medical masks are said to prevent respiratory diseases well (95 students, accounting for 79.17%). The structure of the mask has an outer layer made of a waterproof material to help protect from splashes of liquid and the antibacterial filter cloth in the middle to help prevent fine dust smaller than the aperture of the fabric mask, ensuring better health (Xu and Ren, 2021; Hai and Thien, 2021). In particular, during the Covid-19 pandemic, the government required people to use medical masks, in order to limit the spread of respiratory diseases (Prime Minister, 2020). In economic terms, up to 77 students (64.17%) said that the cost of medical masks is cheap, suitable for students' ability to pay. Currently, the list price for a box of 50 four-layer medical masks ranges from 80,000 VND/box to 95,000 VND/box depending on the brand (Source:https://baocantho.com.vn/khau-trang-y-te-doi-dao-gia-giam-manh-a124513.html). In addition, some students also believe that the use of medical masks is comfortable, aesthetic and partly re-

quired by the government. From the above reasons, it would make students and the community tend to use more medical masks in the future.

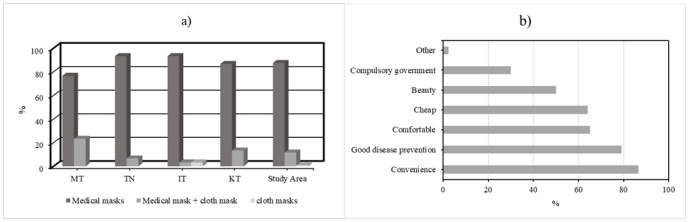


**Figure 1.** Types of Masks Used (a) and Reasons for Using Medical Masks by Students (b)

Figure 2 shows the frequency of mask change in a day and the number of masks used in one time by the interviewed students. For students, the frequency of mask change in a day includes 1 time/day, 2-3 times/day, more than 3 times/day and depending on the case, accounting for 35.8%, 31.7%, 10.85% and 21.7%, respectively (Figure 2(a)). In which, the frequency of changing medical masks once a day accounts for the largest proportion. At the Faculty of Environment and Natural Resources, Faculty of Natural Sciences, School of Information and Communication Technology, School of Economics, the frequency of using a mask once a day accounted for 26.67%, 40%, and 40% and 36.67%, respectively. There is no big difference between Faculties and school in the study area. For this case, students mainly choose to reuse used medical masks for many activities throughout the day, ensuring that the medical masks are not contaminated. The research results also recorded that, in one use, students mainly used only 1 medical mask, accounting for 87.5% with 105 students choosing and, in each Faculty, School such as MT, TN, IT and KT had 80%, 93.33%, 90%, and 90% of students using one mask at a time, respectively (Figure 2(b)). Other forms of use such as 2 medical masks, 1 medical mask combined with 1 cloth mask, 1 cloth mask in one use account for a very low rate. Survey results show that on average, more than 35% of students throw away 1 medical mask per day. From there, it is possible to estimate the amount of medical mask waste generated throughout the campus of Can Tho University. According to statistics, by the end of 2021, the number of students of the University reached 43,850 students. In case, students only use 1 medical mask in one use and change the mask with a frequency of 1 time/day, each day Can Tho University would generate the equivalent of 43,850 masks. In cases where the frequency of mask changes is 2-3 times/day or more, it is estimated that the amount of medical mask waste would be very large, resulting in problems for treatment, collection and disposal. impacts on the environment. According to the study of Selvaranjan et al. (2021), the weight of a medical mask is about 3.5 g, so the volume of medical mask waste generated every day at Can Tho University is about 153.475 kg/day,

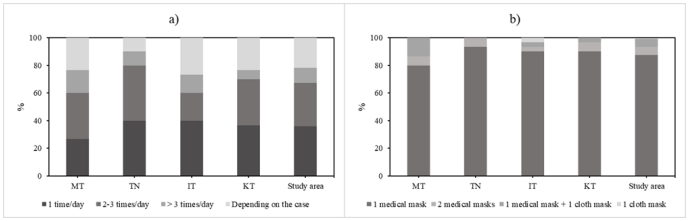


**Figure 2.** Frequency of Mask Change (a) and Number of Masks Used in One Time (b)

equivalent to 56,018.38 kg/year.

### 3.2 Current Status of Medical Mask Waste Management

#### 3.2.1 Current Status of Classification

The results showed that more than 40% of students did not know the status of the department whether to classify medical mask garbage or not. In addition, about 24.17% of students said that all types of waste are put together in one trash can and there is no separation of waste at the source. It is not reasonable to dispose of contaminated medical masks with household waste. In addition, two other opinions suggest that (1) the waste at the faculty is classified but the medical mask waste is put together with the recyclable waste and (2) the waste at the faculty is classified but the medical mask waste is disposed of with non-recyclable waste, both of the questions were selected by 17.5% of students (Figure 3(a)). Disposing of contaminated medical mask waste with recyclables creates many potential hazards for recycling collectors. As the majority of collectors do not equip or do not use protective equipment, such as gloves, which will lead to undue exposure to sources of pathogenic microorganisms. Faced with the fact that mask waste is not cared for and disposed of improperly, the research has found a number of reasons (1) Students do not have the habit of sorting garbage (67.5%, 81 students), (2) There are no sorting bins/tools (49.2%, 59 students) and (3) Students think that medical masks are not dangerous (39.2%, 47 students) (Figure 3(b)). Beside, in the campus of the faculties and schools surveyed, the situation of improperly disposing of medical masks by students was encountered in many places such as in trash cans, desk drawers, courtyards, walkways, canteen (Figure 4).

In addition to direct interviews with students, the study also conducted field observations on the current status of waste classification at faculties and schools. The results of field observations show that the Faculty of Environment and Natural Resources is equipped with waste sorting bins including recyclables, hazardous - infectious solids and other types of garbage (Figures 5(a, b)). Although the Faculty is equipped with a waste sorting box for medical masks, this waste still appears in desk drawers, garages or around the faculty's campus (Figures 5(c, d)). From that, it can be seen that the Faculty of Environment and Natural Resources has

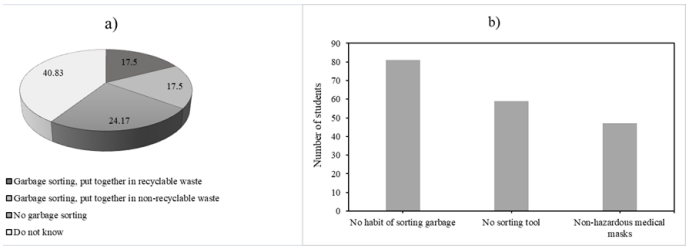


**Figure 3.** Information on the Current Status of Medical Mask Waste Classification (a) and Reasons for not Sorting Medical Mask Waste (b)

**Figure 4.** Some Pictures of Medical Mask Waste in the Study Area

carried out the garbage classification, but the awareness of students in the classification of medical mask waste is not high. For the Faculty of Natural Sciences, all types of waste are put together in one trash, unsorted. Notably, in the laboratory area, the trash cans were arranged without lids (Figure 5(e)). In many cases, the trash can was too full, and the waste was put in black bags and placed on the outside without the container (Figure 5(e)). Medical mask waste on the campus of the Faculty of Natural Sciences was found in bushes, paths and mixed with ordinary garbage (Figures 5(f,g,h)). With this result, it was found that the Faculty of Natural Sciences did not perform garbage classification in general and medical mask waste classification in particular. This would greatly affect the consciousness and actions of students in the faculty in implementing waste classification. For the School of Information and Communication Technology, waste is classified into three categories including biodegradable waste, inorganic waste and recyclables (Figures 5(i,j,k)). Although, the School is equipped with waste sorting containers, the classification of students is not good. Typically, biodegradable trash cans appear waste of medical masks. In general, the School of Information and Communication Technology does classify garbage, but the classification does not take into account medical mask waste that belongs to the category of hazardous and infectious solid waste, as well as students' awareness of waste classification is still limited. On the campus of the School of Economics, there are many trash cans arranged, creating favourable conditions for students to put their garbage in the right place. Although, the University is equipped with many trash cans, but it does not classify garbage and medical mask waste is still thrown by students with other types of waste. In addition, medical mask waste still appeared on the aisles on campus (Figure 5(l)). Because medical masks carry infectious pathogens, it is unreasonable to dispose of medical masks with other types of garbage, making all this waste into hazardous waste. Different environmental conditions and storage times of waste, harmful bacteria in masks will multiply with different levels and lead to many potential risks.

In summary, about the garbage classification, it is found that the Faculty of Environment and Natural Resources, School of Information and Communication Technology has done garbage classification. In particular, the Faculty of Environment and Natural Resources has its own separate bin for medical mask waste. However, the awareness and actions of students of the Faculty of Environment towards the classification of waste in general and medical mask waste in particular are not high, and the garbage is not disposed of in the right place. In addition, for other faculties and schools, it was found that most of the units did not have equipment and separate sorting containers for medical mask waste.

### 3.2.2 Current State of Collection

According to the interview results, at the Faculty of Environment and Natural Resources, students said that the frequency of garbage collection in a semester is 2-3 times, accounting for a large proportion with 56.67%, followed by 3-4 times (accounting for 33.33% of the total), 4-5 times (accounting for 6.67%) and more than 5 times (accounting for 3.33%). Similarly, at Faculty of Natural Sciences, School of Information and Communication Technology, School of Economics, the frequency of garbage collection in a semester is mainly 2-3 times, accounting for 80%, 43.33% and 86.67%, respectively. Among the total opinions of 120 students, four labour frequencies in a semester were identified, including 2-3 times (65.8%), 3-4 times (11.7%), 4-5 times (accounting for 5.8%) and more than 5 times (16.7%) (Figure 6(a)). The waste identified after the collection process is quite diverse, including plastic bottles, plastic bags, grass, dried leaves, dried plants, plastic caps, foam boxes, especially medical masks. Figure 6(b) shows details of the percentage of collected waste composition. Notably, medical mask waste accounted for 66.7% of the waste composition and was not put in the trash, as well as without this waste classification.

### 3.2.3 Student's Awareness about Medical Mask Waste

According to Article 3, Chapter I of the Law on Environmental Protection 2020, hazardous waste is waste containing


**Figure 5.** Some Pictures of Garbage Classification at Faculties and Schools

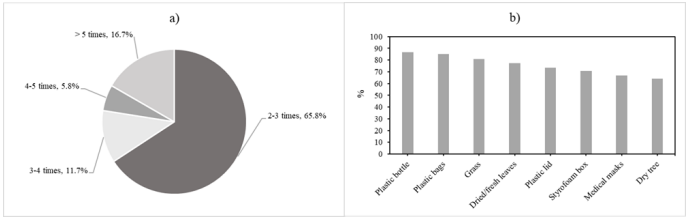


**Figure 6.** Frequency of Garbage Collection in a Semester (a) and Composition of Collected Waste (b)

toxic, radioactive, flammable, infectious, explosive, corrosive, toxic or hazardous elements, other harm (National Assembly, 2020). Medical masks containing activated carbon are hazardous waste, and used medical masks carry bacteria and viruses containing the user's pathogens as hazardous waste. The interview results showed that nearly 41% of students said that medical mask waste is a household waste and only about 28% of students identified medical mask waste as hazardous waste (Table 1). Among the 33 comments that medical mask waste belongs to the hazardous waste category, mainly among students of the Faculty of Environment and Natural Resources (16 students), followed by the Faculty of Natural Sciences (6 students), third is the School of Information and Communication Technology (5 students) and the School of Economics with only 2 students. Thereby, it can be seen that students do not really know and understand correctly about medical mask waste. The reason may be that students do not have enough information about medical mask waste. In the learning process, students mainly learn specialized knowledge, do not have time to learn about this type of waste. Faculties and Universities need to regularly organize propaganda activities to raise student's understanding about hazardous waste and medical mask waste that need to be classified, and at the same time implement measures to encourage students to avoid hazardous waste. appropriate incentives and rewards.

The composition of a medical mask includes a nose clip, an elastic band, a dust filter layer, an activated carbon layer and a non-woven fabric layer. The results of the interview about the non-biodegradable ingredients in medical masks showed that the nose clip was considered the most difficult to decompose (accounting for 60.8% of 73 students selected). The structural components of the nose clip bar are mainly PP (polypropylene) primary plastic. This is the most commonly used material in the production of medical masks, which is susceptible to optical, thermal and atmospheric degradation (Tocháček and Vrátníčková, 2014; Bajer and Braun, 2014; Wang et al., 2021). In the natural environment, PP is a non-biodegradable material, the degradation of polypropylene is slowed down due to its hydrophobicity, high molecular weight, lack of active functional groups, and the repeated chain of methylene leading to persistence

 

**Table 1.** Student's Perception of Medical Mask Waste

| Perception | No. of Students | Rate (%) |
|---|---|---|
| Sorting medical mask waste | | |
| Hazardous waste | 33 | 27.5 |
| Normal waste | 29 | 24.2 |
| Domestic solid waste | 49 | 40.8 |
| Don't know | 9 | 7.5 |
| Non-biodegradable ingredients in masks | | |
| Nose clip | 73 | 60.8 |
| Plastic ring | 72 | 60 |
| Dust filter layer | 44 | 36.7 |
| Activated carbon layer | 24 | 20 |
| Non-woven fabric layer | 54 | 45 |
| Hazardous ingredients in masks | | |
| Nose clip | 45 | 37.5 |
| Plastic ring | 38 | 31.7 |
| Non-woven fabric layer | 46 | 38.3 |
| Microfiltration layer | 72 | 60 |
| Activated carbon layer | 36 | 30 |
| The impact of masks on the environment | | |
| Carries disease-causing pathogens | 94 | 78.3 |
| Effects on the air environment | 43 | 35.8 |
| Impact on water environment | 79 | 65.8 |
| Impact on the soil environment | 102 | 85 |
| The level of disease spread from medical masks | | |
| Very serious spread | 22 | 18.3 |
| Serious spread | 39 | 32.5 |
| Moderately spread | 35 | 29.2 |
| Spread less | 24 | 20 |
| The level of concern about mask classification | | |
| Very much in need of attention | 71 | 59.17 |
| Need attention | 46 | 38.33 |
| Don't know | 3 | 2.5 |

and longevity in the environment, taking from 100 to 500 years to completely decompose (Xu and Ren, 2021). Next is the rubber band, which 60% of the students identified as a non-biodegradable component. Elastic bands are made from petroleum-based polyester resin, which takes 20-200 years to completely decompose in the natural environment (Rumon and Dorris, 2020). The third component is non-woven fabric, with 45% of students choosing. This layer of non-woven fabric is mainly made of polypropylene (Hai and Thien, 2021). Plastic products are not easily biodegradable but can be fragmented into smaller plastic particles, namely microplastics (<5 mm) and nanoparticles (<1 µm) widely distributed in ecosystems (Mattsson et al., 2018). Regarding the level of recognition of hazardous ingredients in masks, up to 60% of students think that the microfiltration layer is the most dangerous ingredient. This layer has the role of filtering, keeping dust and bacteria of humans during use. In addition, the activated carbon layer is one of the harmful ingredients, because of its adsorption properties. Here, fungi and viruses will be retained and continue to multiply if masks are not managed properly. However, this ingredient was identified by only 30% of the interviewed students as a hazardous ingredient. In general, students had a correct view of the microfilter layer of the mask as a hazardous ingredient, but the activated carbon layer was not known to many students as a hazardous ingredient.

In terms of chemical composition, the excessive use of medical masks and poor handling of medical mask waste can cause many environmental problems and affect human health. Research results show that nearly 80% of interviewed students said that medical mask waste would carry pathogens that cause disease to the community with four levels of spread including very serious infection (18.3%), severe (32.5%), moderate (29.2%), and mild (20%). Medical masks can accumulate and release harmful chemical and biological substances, such as bisphenol A, heavy metals as well as

**Table 2.** Perception of Students of Solution for Medical Mask Management

| Solutions | No. of Students | Rate (%) |
|---|---|---|
| Use alternative products | 107 | 89.2 |
| Arrange more trash bins with separate classification for medical mask waste | 115 | 95.8 |
| Propaganda through social platforms | 113 | 94.2 |
| Integrate into staff training/extra-curricular activities/classes | 97 | 80.8 |
| Deducting training points | 83 | 69.2 |
| Preparing manual for handling | 64 | 53.3 |
| Fine | 33 | 27.5 |

pathogenic microorganisms (Xu and Ren, 2021). At the same time, improperly handled masks can carry pathogenic microflora, especially the SARS-CoV-2 virus, thereby becoming a carrier material or object (Van Doremalen et al., 2020) and is considered hazardous waste (Dharmaraj et al., 2021). Besides, according to Rozana et al. (2021), medical masks are protective tools, covering the nose and mouth, the potential risk of containing microorganisms trapped in the mask is very large with about 47% coliform bacteria, 33% pathogenic bacteria and the remaining 20% are non-specific bacteria. Regarding the issue of air environment, only about 35.8% of interviewed students said that medical masks contribute to air pollution. First at the production stage, processes in the production of masks such as fabric manufacturing, sewing, weaving, polypropylene processes contribute to $CO_2$ emissions, potentially contributing to global warming (Selvaranjan et al., 2021). According to research data of Klemeš et al. (2020), the manufacturing process of N95 masks releases 50 g of $CO_2$-eq/mask. This will have a huge impact on air quality because every year millions of masks are produced globally.

Up to 65.8% of interviewed students said that the water environment would be polluted if medical mask waste was not handled properly. Typically, in recent times, medical masks have been considered an emerging source of microplastics, polluting the water environment, harming aquatic organisms and human health (Sana et al., 2020; Jimoh et al., 2023). The slow degradation of polypropylene and polyethylene fibers derived from masks generates large amounts of microplastic pollutants (Hasan et al., 2021). As estimated by Chen et al. (2021), medical masks, but this number increases significantly when the mask is used, ranging from 1146.00±307.60-1478.00±265.80 particles/mask. The number of microplastic particles in the water reaches about 1,566,560 particles/mask when they are completely decomposed (Wang et al., 2021). When microplastics exist in the aquatic environment, they will affect aquatic organisms, some effects such as restricting the growth rate of animals, hindering reproductive functions, neurotoxicity, depression, etc. decreased dietary habits, decreased metabolic rate, and increased mortality in aquatic organisms (Jimoh et al., 2023). Moreover, mask waste can also cause breast toasting, which impedes movement and leads to death for many aquatic animals (Selvaranjan et al., 2021). The consumption of microplastics causes serious adverse effects on human health, such as chromosomal changes, obesity, cancer and infertility (Sharma and Chatterjee, 2017). Notably, up to 85% of interviewed students said that medical mask waste seriously affects the soil environment. In the form of burning and burying solid waste, components that are difficult to decompose and secondary microplastics from mask waste will accumulate and persist for a long time in the soil, causing deterioration of soil quality (Barnes et al., 2009; De Souza Machado et al., 2019; Mentari and Khoironi, 2022). Landfilling with plastic waste leads to poor soil fertility, as it takes more than 500 years to fully decompose (Chamas et al., 2020) and the decomposition of plastic also releases toxic substances (Webb et al., 2012).

From the negative effects of medical mask waste on environmental components such as soil, water, air, organisms and even human health, the students' perception of the need. This waste classification is still not high, only more than 59% of students think this issue is "very concerned".

Facing the current situation of using, classifying garbage and equipment for garbage sorting is still limited, typically for medical mask waste at faculties and schools, the research has come up with a number of construction and pilot solutions. The process is as shown in Table 2. For the current use situation, because the demand for medical masks in the student community is quite large, creating a large amount of unwanted waste to be discharged into the environment. replacement is really necessary, typically antibacterial cloth masks (accounting for 89.2% of students agree). In garbage classification activities, the most important thing is that within the premises of faculties and schools of Can Tho University, it is necessary to fully and reasonably arrange trash cans with specific garbage classification labels, especially to arrange garbage cans. More trash sorting bins for medical masks. This opinion is agreed by most of the surveyed students (115 students, accounting for 95.9%). When

garbage sorting equipment is fully arranged, the next issue that needs attention is to raise awareness and actions of students in waste classification. With some proposed solutions such as the first, propagating waste classification information through social platforms. In the current technology era, the use of social networks has become popular, so accessing information such as the benefits and necessity of waste classification, including mask waste health care for students in particular and more broadly for many other subjects will become easier. This opinion received the consensus of more than 94% of the students interviewed. Secondly, it is necessary to integrate the problem of sorting medical mask waste into staff training classes/extra-curricular activities/study sessions, with about 80.8% of the interviewed students agreeing with this solution. Third, minus points for training for students, in case students are caught disposing of medical mask waste at the wrong place in particular and do not perform waste classification in general. This solution requires the coordination and control of the union officials to improve the quality and efficiency. Fourth, implement and issue manuals on waste classification, arranged in the library, faculty lobby, or posted at conspicuous locations on the faculty's campus. Fifth, the solution of fines for not doing well the garbage classification. In general, the proposed solutions are feasible, receiving the high consensus of the student community of the surveyed faculties and schools. Therefore, in the coming time, training units need to make specific plans and implement them.

## 4. CONCLUSIONS

Medical masks are widely used in the student community of Can Tho University, every day about 43,850 masks is used, equivalent to 153.475 kg.garbage/day. The amount of waste generated is large, but the garbage classification is still inadequate. At the Faculty, the University still lacks equipment, garbage sorting bins in general and medical mask waste sorting bins in particular, as well as students' awareness about the problem of garbage classification is not high. For collection activities, on average, students work 2-3 times each semester with a fairly diverse composition of waste including biodegradable organic waste, inorganic waste and medical mask waste accounting for the majority of the waste. The level of student's awareness of medical mask waste has some limitations, through the perception that medical masks are household waste (accounting for 40.8% of students), the need to pay attention to the classification of medical mask waste (59.17%). As for the difficult to decompose and hazardous ingredients in medical masks, the level of impact of medical mask waste on the environment and human health, most of them are highly appreciated by students. This study contributes to enriching scientific data sources in the field of waste, especially medical mask waste.

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