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Research Paper - Air pollution in Taiwan

In Taichung, the sky always seems gloomy and greyish. The sky is regularly covered with clouds, like it is about to rain. But those aren't clouds. For children living in Taichung, seeing a blue sky might be their dream since it's rare to see blue sky in that city. The sky looks so gloomy that there are barely any stars visible at night. This is the situation in other cities in Taiwan as well, and it is becoming more common. Smoggy skies are one of the most visible effects of air pollution on the environment.

Air pollution harms people's health and causes hazardous diseases. Exposure to pollutants will not only damage people's lungs, it will also hurt the whole circulatory system. Too much exposure to pollutants leads to lung cancer, and even diabetes. Moreover, air pollution is the main factor driving global warming.

In 1975, the Executive Yuan of Taiwan formulated the Air Pollution Control Act to control pollutants such as PM10 and carbon monoxide. This was when the government started to notice and deal with this issue. In 2010, there was a protest against the Kuokuang Petrochemical Technology Company project, since this factory was going to emit a large amount of PM2.5. The government then opposed the project. After this incident, both the citizens and the government of Taiwan started to pay more attention to air pollution problems. It has been eleven years since the incident, but air pollution is still a major problem. It should be fixed as soon as possible.

#### Literature Summary

There is a lot of research and literature that discusses air pollution in Taiwan. Most of these sources say that the air pollution in Taiwan is severe. The sources provide evidence of what is causing air pollution in Taiwan, as well as its effects, to show how the air pollution in Taiwan is an issue that should be addressed.

One of the sources that supports the idea that air pollution is a major problem in Taiwan is a report written by Chia-Pin Chio and Chang-Chuan Chan, a PhD student and professor from National University of Taiwan. This report is about how air pollution is affecting people's health in Taiwan. According to Chan, large numbers of epidemiological and experimental studies consistently show how exposure to pollutants, such as particulate matter, can harm the cardiovascular system and cause diseases. Two studies quoted in the report, done in southern and northern Taiwan, show that PM2.5 was associated with increased risk of death from circulatory disease by 44 percent (Chan). Another study cited in their report that was done in central Taiwan demonstrates that cardiovascular mortality associated with PM10 increases by four percent. Clearly, according to Chang-Chuan Chan and Chia-Pin Chio, air pollution is damaging Taiwanese people's health.

Another source that contributes to this topic is an article done by Kai-Jen Chuang, and Hsiao-Chi Chuang. They are PhD students at Taipei Medical University. This article discusses the relationship between air pollution and cardiovascular disease in Taiwan. The researchers focused their research on the northern part of Taiwan. Chuang took data from Shuang-Ho Hospital in New Taipei City. They looked at the biomarkers of patients with cardiovascular diseases and the average amount of pollutants they were exposed to per day. According to Chuang, there are significant positive correlations between pollutants and

a person's heart rate, spontaneous bacterial peritonitis, and red blood cell concentration. There are negative correlations between air pollutants and the hematocrit concentration. In other words, the results show that air pollutants will have a negative influence on the human body.

Keoni Everington, a staff writer for Taiwan News, also believes that air pollution is an issue in Taiwan. In an article he wrote in 2021, he reported that on February 25th, a thick layer of smog triggered a red alert at 13 weather stations and an orange alert at 26 weather stations in Northern and Western Taiwan. The EPA uses different colors to classify different parts of the air quality index. A maroon alert symbolizes that the air is hazardous. The order goes on as purple, red, orange, yellow, and green. According to Everington, the EPA predicts that the air quality in certain areas might worsen due to seasonal winds that cause air pollutants to accumulate.

Another article written by Greenpeace Taiwan shows how severe the air pollution in Taiwan is and what the causes of Taiwan's air pollution are. In 2016, Taiwan was in the 37th place out of 39 countries in the air pollution section of the environmental indicator rank announced by the OECD (Greenpeace). This shows that Taiwan has poor air quality. This article also discussed how high levels of PM2.5 particles raises the risk of having lung cancer by 15 percent while the risk of stroke, heart disease, and pulmonary disease increases by 25 percent. According to Greenpeace, most of Taiwan's air pollution is caused by transportation and factories. This source talks a lot about how air pollution is harmful to the human body as well as the causes of air pollution in Taiwan, so it is an important source in discussing this issue.

In an article published by the European Environment Agency, the authors interviewed Catherine Ganzleben, the head of a group on air pollution, environment and health, and Alberto González, an EEA air quality expert, to learn more about air pollution. Ganzleben states that air pollution is one of the biggest immediate risks to health. Moreover, air pollution also causes climate change, which might cause forest fires and threaten food production. In the same article, Alberto Gonzalez reports that more than 400 thousand deaths were caused by fine particles in Europe in 2018. Besides just cardiovascular diseases and cancer, air pollution is also associated with diabetes and mental disorders such as dementia (González). This shows how air pollution is harmful and even deadly. Air pollution also has a huge impact on the environment. For example, it reduces biodiversity in ecosystems and affects the growth of crops. Buildings are also affected by air pollution (González). There are often many acidic particles in polluted air, such as sulfur dioxide. When this type of acidic particle combines with water, they form acid rain and can corrode buildings.

The articles above show how air pollution is a serious problem in Taiwan by showing data and offering expert opinion. They show that air pollutants can lead to serious health problems such as lung cancer and stroke. Pollutants also lead to global warming and climate change. In conclusion, not only does air pollution damage everyone's health, it also harms the environment. From the above literature, we can see that air pollution is a major problem in Taiwan.

## Findings

Air pollution is a problem in many countries, but this is especially true in Taiwan. The pollution is so terrible that it is killing people. After looking at the literature, it is clear that air pollution is harmful for both humans and the environment. The sources above also point to the fact that air pollution needs to stop if we

don't want our friends and families to be threatened by this invisible monster.

Firstly, one of the main causes of air pollution in Taiwan is vehicles, especially cars and scooters (Greenpeace). According to Greenpeace, there are too many cars and scooters in Taiwan. In the article, the author especially points out that diesel cars manufactured before the 30th of June in 1999 emit the most pollutants of all vehicles. Although there might not be many vehicles made from before 1999 that are still on the road, a small amount of them is already producing a large amount of pollutants that damage the environment and worsen the air quality. Furthermore, the authors of Greenpeace dug up the findings of the International Agency for Research on Cancer and found out that the emissions from diesel cars are also classified as substances that lead to cancer. The agency also told the governments of different countries to decrease the chances of letting their citizens be exposed to these substances. In the article, Greenpeace cites statistics compiled by the Ministry of Transportation and Communications and shows that there were more than 22 million cars and scooters in Taiwan in the April of 2021. These vehicles give off a huge amount of emissions that will worsen the air quality in Taiwan.

Another reason why the air in Taiwan is polluted is because of the pollutants from places outside of Taiwan. For instance, 40 percent of Taiwan's air pollution comes from Mainland China (Greenpeace). Due to seasonal winds such as the northeastern monsoons, particulate matter including PM2.5 and PM10 are blown from China to Taiwan. The EPA predicted that there might be a red alert for the AQI in Northern Taiwan, and mostly orange alerts in other parts of Taiwan. Chang-Chuan Chan, a professor from NTU also agrees that pollutants from China aggravate Taiwan's air pollution. He also adds that Taiwan's air pollution is influenced by Asian dust storms and smoke haze. Pollutants from China are a huge problem for Taiwan. It is hard to control places outside of Taiwan, so the government should be putting even more effort into controlling air pollution that is made in the country.

The poor air quality in Taiwan is also caused by high polluting industrial plants. Although most industrial plants are in southern Taiwan, since Taiwan is a windy country, the wind blows pollutants all around the island, affecting the air quality of the whole country. Coal-fired power plants cause about 900 premature deaths in Taiwan every year (Greenpeace).

As mentioned above, air pollution has a negative impact on the human body. According to Professor Chang-Chuan Chan, too much exposure to air pollutants increases the risk of death from circulatory disease. In the article by Kai-Jen Chuang, who is a PhD student from Taipei Medical University, he mentions that the heart rate and red blood cell concentration of a person is also associated with the amount of exposure to pollutants. The article written by Greenpeace Taiwan also explained how air pollution is harmful for the body. For instance, Greenpeace states that too much exposure to PM2.5, a type of pollutant, increases the risk of having lung cancer, stroke, and pulmonary diseases. Lastly, in the interview with González, an EEA air quality expert, he states that air pollution might even lead to diabetes and dementia. Air pollution causes many kinds of diseases that can be deadly. Therefore, the government needs to be addressing air pollution problems immediately.

The findings from the literature show different causes of poor air quality in Taiwan and the influences of air pollution. Also, they show that air pollution is definitely a serious issue in Taiwan. It has a huge impact on both the environment and the human body. Looking at the findings above, it is obvious that this problem needs to be addressed immediately.

## Conclusion

Air pollution is one of the major problems in Taiwan. People should be paying more attention to problems such as air pollution instead of following gossip and celebrity affairs.

To further address this problem, the government should be establishing laws to reduce air pollution. For example, the government should set a law to tell citizens to replace aging motorcycles and change the type of fuel their vehicles use to reduce emissions. The government can also try to communicate to China about their air pollution and how it's affecting Taiwan. Most importantly, citizens should cooperate with the government in order to address this problem effectively.

Citizens then should follow the regulations passed by the government. They should also be trying to make a change to this issue by reducing their carbon footprints. There are many ways to reduce carbon footprints. The main ways are the three Rs, which are reduce, reuse, and recycle. Citizens should ride on public transportation, rather than driving a car by themselves. This can help reduce carbon emissions because there will be fewer cars on the road. Citizens should also avoid using disposable plastic packaging, because while producing and burning plastic, there will be a huge amount of carbon emitted by the factories.

If air pollution is still not addressed, people will get sick and the environment will be damaged. Our descendants will have to live in a polluted environment, which will be harmful for their health. We should do the best we can to fix this problem in order to take care of our country.

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