

A SURVEY ON COLLEGE STUDENTS' PERCEPTION AND COPING BEHAVIORS FOR SMOG – A CASE STUDY OF GUANGZHOU

BY

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Abstract

In recent years, there have been many yellow warnings of haze occurring in Guangzhou, which have seriously endangered the daily life and physical and mental health of residents. College students are an important part of the social elite and will be the main force for China to conquer the war of the "blue sky" in the future. Mastering and understanding college students' perception and coping styles will help to adopt corresponding strengthening measures. This study aims to use the questionnaire method to realize the college students' perception and their coping behavior for smog in Guangzhou, in order to provide related knowledge for college students, schools and the government for knowing how to participate with coping smog. The results show that: Firstly, college students have enough perception for the components, causes and hazards of smog, and most college students can also adopt protective measures to reduce the hazards in smog weather. Secondly, college students participate in smog responses by changing their travel patterns. In addition, this study suggested that schools can organize various campus activities to assist students in enhancing their perception of smog and improving their personal protective measures. As for the suggestion to the government, that it can control smog pollution by formulating relevant national laws.

KEYWORDS: haze perception; Coping behavior; Air Quality Index (AQI) ; Environmental awareness; Questionnaire survey

Introduction

After 43 years reform and opening up of China, the industrialization and urbanization process rapidly, their economy has become the fastest growing country in the world with an average annual growth rate of 9.5%. However, this extensive economic growth model has made environmental pollution increasingly serious. In recent years, air pollution incidents such as "haze" and "heavily smog locking the city" have instantly attracted attention from all parties (Gu, 2021; Chen and Chen, 2018). Although the *occurring* frequency of smog events in Guangzhou has been reduced and the condition of pollution has also been reduced in recent years, the smog has not been completely eradicated (Shang et al., 2020). The weather of haze has caused great trouble for people's health, transportation, industrial development, etc. (Wang, 2022), which has become a top priority for the whole people and the government. However, the root reason is the environmental issue caused by human activities, and also is

the problem between human and land relations that is geography studying pays attention to. In other words, if the ideological haze is not eliminated, the institutional haze will be difficult to eradicate, meanwhile, the air haze will be even harder to eradicate (Yan, 2015).

Therefore, citizens' perception of and response to haze directly affects the eradication of haze. It is a chain reactions that if the popularization of haze-related knowledge is not in place, resulting in insufficient citizens' perception of haze, citizens' response to weather of haze will be insufficient, citizens' enthusiasm to participate in haze prevention and control will be low, and their awareness of environmental protection will be weak, Thus seriously restricting the implementation of the "blue sky defense war" policy. As the builders of the future society and the main force of environmental protection, college student's perception of

haze and their awareness of environmental protection are more important to the construction of a beautiful China. However, the current research on haze perception and response mainly focuses on the analysis of the impact factors of public haze risk perception on coping behavior intention (Wang, 2020; Wu, 2020). The research on the college students is still few and incomplete, it only analyzes the college students' perception of smog or the characteristics of their coping behaviors, but does not put forward specific solutions to the analysis results (Zhao, 2016; Liu and Luo, 2020). Based on above reason, this study through the investigation of haze perception and coping for college students in Guangzhou, understanding the condition of college students' perception for haze pollution hazards and causes, then finds out the characteristics of college students coping behaviors under the current situation of haze air pollution. Meanwhile, looking for reasonable and effective governance measures to deal with haze pollution, so as to provide college students with reference, school measures, and proposed relevant suggestions for the government's environmental governance.

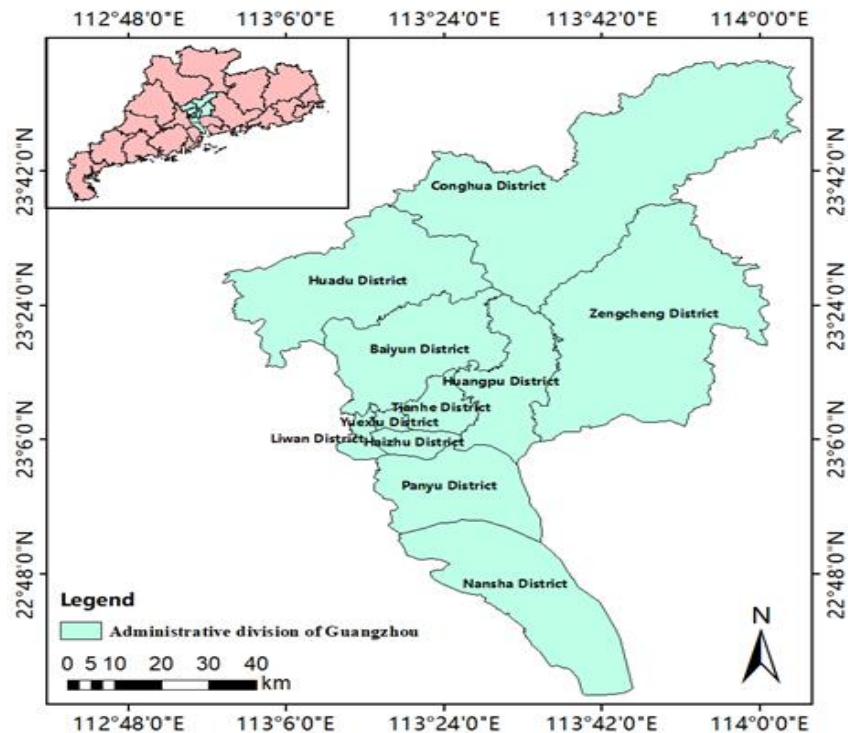
STUDY AREA

Guangzhou is located between $112^{\circ}57' \sim 114^{\circ}3' E$ and $22^{\circ}26' \sim 23^{\circ}56' N$. Abbreviated as "Sui", also known as Yang-Cheng and Hua-Cheng, it is a prefecture-level city under the jurisdiction of Guangdong Province. Meanwhile, it possesses many famous titles such as the provincial capital of Guangdong Province, a sub-provincial city, a national central city, a megacity, a core city in the Guangzhou metropolitan area, and an important central city, an International Trade Center and a comprehensive transportation hub in China approved by the State Council. As of 2021, the city has 11

districts with a total area of 7434.40 square kilometers and a resident population of 18.8106 million. In 2021, the city's GDP reached 2823.197 billion yuan (The State Council(a), 2016; GSB, 2019; GSB, 2020; GMPG, 2021). In addition, Guangzhou is located in the south of China, downstream of the Pearl River and close to the South China Sea. It is the headquarters of the southern China theater of operations, the national logistics hub, the national comprehensive gateway city, the international comprehensive transportation hub, the first batch of coastal open cities, the south gate of China to the world, the central city of the Guangdong-Hong Kong-Macao Greater Bay area and the Pan-Pearl River Delta economic zone, as well as the hub city of the Belt and Road (Fang, 2021 ; The State Council(b), 2016; Yan, 2021).

When it comes to the changes of administrative districts in Guangzhou, the overall planning districts at this level are Yuexiu, Haizhu, Liwan, Tianhe, Baiyun, Huangpu, and Nansha, which are referred to as "the seven old districts". In which, Dongshan, Fangcun, and Luogang were originally one of the seven old districts, later which were abolished due to merger, then Nansha became a part of the new one belongs to "the seven old districts". In addition, the four old districts originally refer to Yuexiu, Dongshan, Haizhu, and Liwan District, but after the regional adjustment, the three old districts (original urban areas) were adopted, which refers to Yuexiu, Liwan, and Haizhu District. Thus, the four new districts are formed by Panyu, Huadu, Conghua, and Zengcheng District. In general, Guangzhou now has 11 administrative regions (show as Figure1).

Figure 1. The map of the study area's administrative division



Smog condition in Guangzhou in recent years

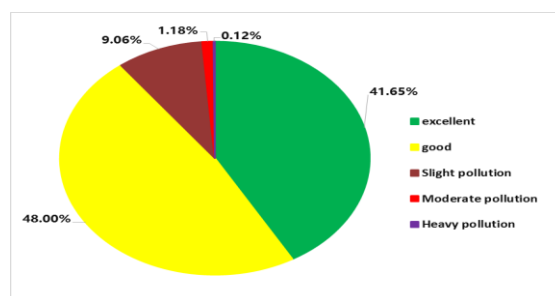
The haze index, that is, the Air Quality Index (AQI) which can be used to measure the haze in Guangzhou from 2020 to 2022. The AQI is to simplify the monitored air concentration into a single conceptual index value form according to the proportion of various components in the air. It is used to express the air pollution degree and air quality status in grades (show as Table 1) and to express the short-term air quality status and change trend of the city.

Table 1. The grade and significance of AQI

AQI	Quality grade	Significance
0-50	Excellent grade	The air quality is satisfactory, there is basically no air pollution, and all kinds of people can move normally.
51-100	Good	The air quality is acceptable, but some pollutants may have a weak impact on the health of a very small number of exceptionally sensitive people. It is suggested that a very small number of exceptionally sensitive people should reduce outdoor activities.
101-150	Slight pollution	The symptoms of susceptible people are mildly aggravated, and the symptoms of healthy people are irritating. It is suggested that children, the elderly, and patients with heart and respiratory diseases should reduce long-term and high-intensity outdoor exercise.
151-200	Moderate pollution	It will further aggravate the symptoms of susceptible people and may affect the heart and respiratory system of healthy people. It is recommended that patients with diseases avoid long-term and high-intensity outdoor exercise, and the general population reduce outdoor exercise appropriately.
201-300	Heavy pollution	The symptoms of patients with heart disease and lung disease are significantly aggravated, their exercise tolerance is reduced, and the symptoms are common among healthy people. It is recommended that children, the elderly and patients with heart disease and lung disease stay indoors, stop outdoor sports, and the general population reduce outdoor sports.
301-500	Serious pollution	Healthy people have reduced exercise tolerance, obvious and strong symptoms, and some diseases appear in advance. It is recommended that children, the elderly, and patients should stay indoors to avoid physical exertion, and the general population should avoid outdoor activities.

According to the data, the air quality of Guangzhou from January 2020 to April 2020 showed a good trend, accounting for 48% (show as Figure 2), but it was found that the number of days with heavy degree pollution accounted for 0.12%. In addition, according to the data on the website of the China Meteorological administration, a yellow warning of haze in Yuexiu District and Tianhe District was issued on January 15, 2021. In addition, the number of days with moderate degree pollution accounted for 1.18% of the total number of days. Light degree pollution accounted for 9.06% of the total number of days. Therefore, the number of days with haze pollution in this period accounts for about 10.36% of the total, and the proportion is still relatively large, which indicates that the prevention and control measures of haze need to be improved and strengthened.

Figure 2. The overall air quality and the proportion of days in Guangzhou from 2020 to 2022 (Data source: PM2.5 Historical Data website. <https://www.aqistudy.cn/historydata/about.php>)



RESEARCH METHOD

Literature Review Method

The literature research method is a method for consulting, analyzing, and sorting literature to explore the problem according to the needs of the research topic. This paper searches the literature on the theme of "haze perception" through searching engines such as China knowledge network, baidu academic, Wanfang, VIP, and other databases. After sorting out and analyzing, it is found that there few literature on the theme of "College Students' perception of haze", and the content of the literature is not perfect. It only mentions college students' perception of haze, without corresponding solutions being proposed. Therefore, the research theme of this paper aims to propose corresponding measures to prevent and control smog on the basis of College Students' perception of smog.

Questionnaire Survey

Questionnaire method is a widely used method in social investigation in the realm of academic research. Questionnaire refers to a form used for statistics and surveys to express questions in the form of designing questions. Questionnaire method is a method that researchers use this kind of controlled measurement to measure the problems they study, so as to collect reliable data. Most of the questionnaires are sent by mail, individual distribution or collective distribution, and the respondents fill in the answers according to the questions in the form.

This study selected college students in Guangzhou as the survey objects. The questionnaire's design content included the main components of smog, the causes of formation, the impact of smog, and protective measures. The questions were filled in freely by the respondents, so as to understand their perception of smog and their corresponding behaviors. The time limit for filling in this

questionnaire is from 20:00 on April 30, 2022, to 20:00 on May 2, 2022. A total of 107 college students completed the questionnaire during this period. Data processing, using questionnaire star, Excel, and other software to statistically analyze and process the data, and producing corresponding statistical charts to obtain relevant results, so as to provide theoretical basis for the prevention and control of smog weather.

INVESTIGATION, ANALYSIS, AND DISCUSSION

College Students' perception of smog

The perception of haze in this study is investigated and analyzed from three aspects: haze material composition, haze formation reason, and haze impact, which are described as follows:

Perception of Haze Substance Composition

According to the recovered survey data, most college students have a basic understanding for the composition of smog (show as Figure 3), that is, 83.02% of college students realize that the most important component of smog is PM2.5. 61.32% of college students believe that the components of haze are sulfur dioxide and nitrogen oxides, which is the same as many scholars believe. The main components of haze are sulfur dioxide, nitrogen oxides, and inhalable particles. The first two are gaseous pollutants, and the last one is a Particulate Matter (PM), which aggravates haze weather pollution. They are combined with fog, making the sky gray instantly (Liu and Luo, 2020; Deng and Zhang, 2020; Lei, 2018; Han, 2020; Fu, 2014). As for the other components of the haze, carbon monoxide, tiny water droplets, and PM10 account for 45.28%, 42.45%, and 35.85% respectively, which indicates that most college students have a deep understanding of the haze components. It may be that they take the initiative to consult data in life to understand this knowledge, or in cities with haze weather, schools and the government may popularize this knowledge

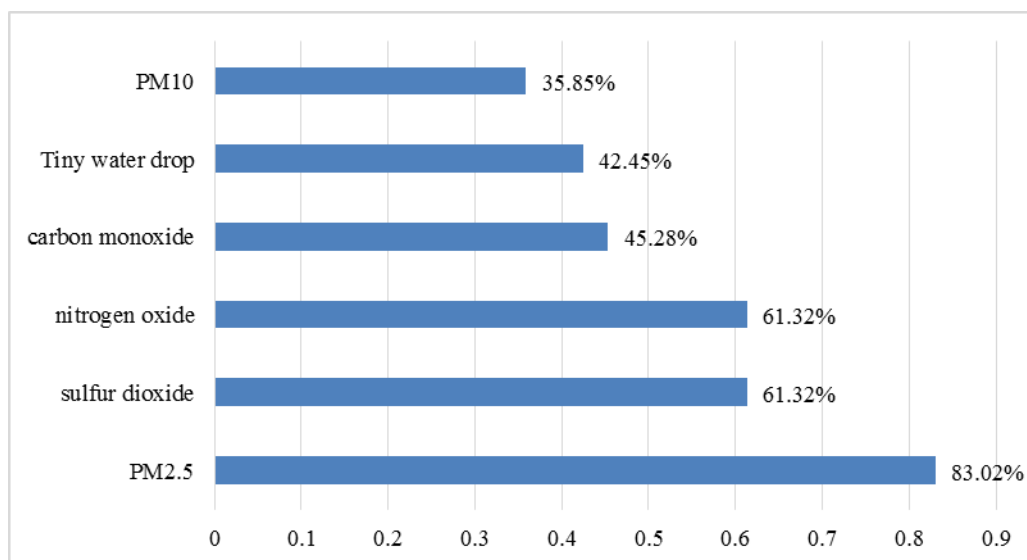


Figure 3. The Statistical Chart of College Students' Perception for Haze Components and Cause

Cause and Perception of Haze

It is reported that college students have a relatively clear perception of the causes for smog (show as Figure 4), of which 97.2% and 93.46% believe that automobile exhaust emissions and the combustion of fossil fuels such as coal are the main causes of smog. Secondly, 85.98% believe that industrial production is the cause of haze, which shows that the opinion of most college students are consistent with those of some

scholars, that industrial production will lead to the emergence of toxic particles, SO₂, NO₂, and other exhaust gases, thus causing air pollution (Wang, 2022; Dai, 2013; Yang, 2017). At the same time, 69.16% and 57.01% of college students think that fireworks and insufficient greening are also the one of critical reasons for haze. Thus, the perception of these two reasons can provide college students with ways to participate in haze control, that is, to reduce the discharge of fireworks and a variety of green plants.

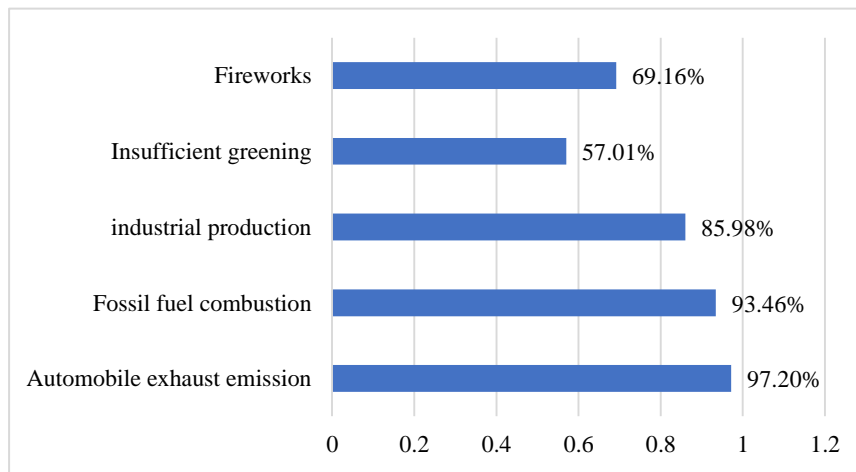


Figure 4. The Statistical Chart of College Students' Perception for Smog Causes

Impact Perception of Haze

Some fine pollutants contained in haze can directly enter and adhere to the human respiratory tract and alveoli, and then cause inflammation of the respiratory system. If they are in this environment for a long time, they easily induce lung cancer. Haze weather will also affect the cardiovascular and cerebrovascular system, genitourinary system, skin, etc. in addition, under haze weather, the environmental visibility will be greatly affected, endangering traffic safety, leading to the closure of air, highway, and railway transport stations and lines, the delay and obstruction of transport flights, and the blocking, congestion, and outage of urban public transport (Sun and Zhang, 2016). In addition, smog will also have a negative impact on people's lifestyles. Many people have been forced to stop outdoor sports to avoid the harm of smog. According to the survey data (show as Figure 5), 91.59% and 94.39% of college students believe that the main impact of smog on us is manifested in traffic safety and respiratory system, which shows that college students have a deep understanding of the main impact in their lives through reports or news events about traffic accidents caused by smog.

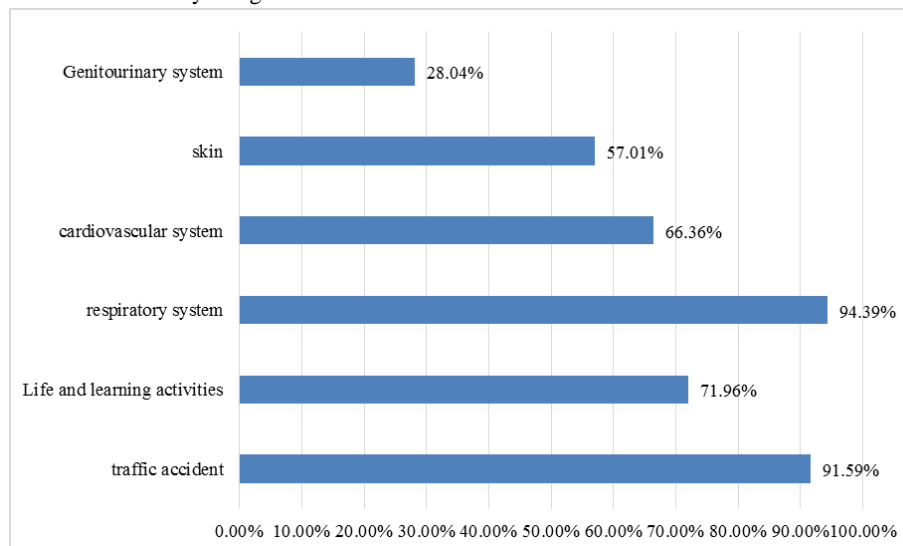


Figure 5. The Statistical Chart of College Students' Perception for Haze Impact

College Students' Behavioral Responses to Smog

This study investigates and analyzes the behavioral response to smog from two aspects: whether college students take protective measures when facing smog and how to choose personal protective measures. They are described as follows

Whether Protective Measures are taken against Smog

According to the survey data (show as Figure 6), 76.64% of college students will take protective measures in haze weather, which shows that most students have a strong perception of haze hazards and a certain sense of protection. However, 23.36% of the college students did not take any measures during the haze weather, which shows that these college students pay relatively weak attention to the haze, so they should strengthen the study of haze knowledge, so as to improve their awareness of protection.

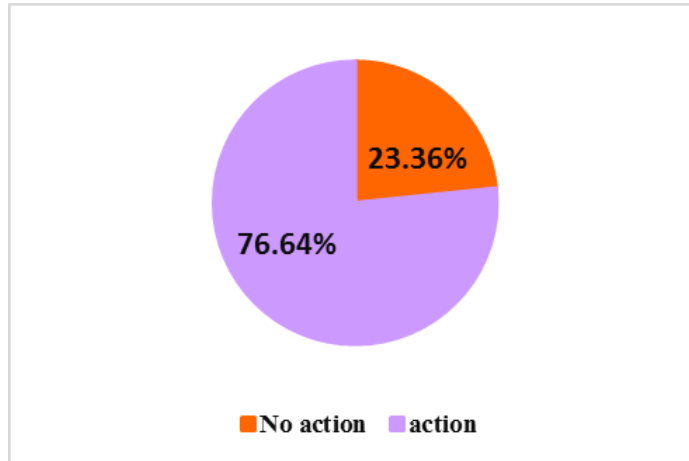


Figure 6. The Statistical Chart of Whether Universities Take Protective Measures Against Smog

How to Choose Personal Protective Measures

According to the survey data (show as Figure 7), 32.27% of the college students who took protective measures and took professional anti-haze masks to reduce the harm of haze when they needed to go out in haze weather. At the same time, 21.73% of them will wash their bare skin immediately after going out and returning, which shows that these college students have a strong perception of the harm of haze to their skin. However, due to college students' academic tasks and high requirements for outdoor activities, the two protective measures such as reducing outdoor activity as well as indoor use of air purifiers account for less, accounting for 15.34% and 13.74% respectively.

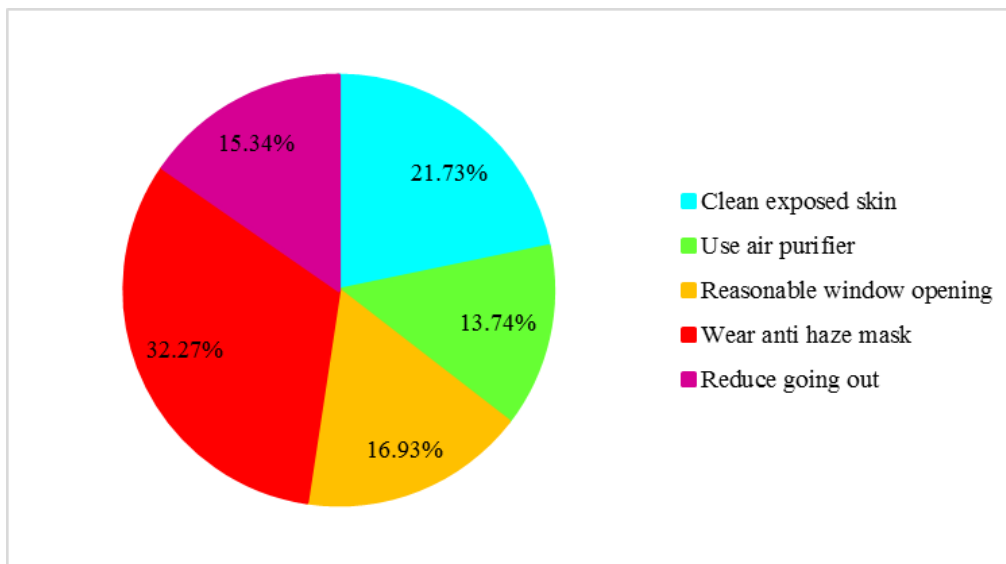


Figure 7. The Statistical Chart of Selection for Personal Protective Measures

COUNTERMEASURES AND SUGGESTIONS ON HAZE POLLUTION

Individual Behavior of College Students

Change Travel Mode

According to the survey data, 92.52% of the people are willing to use public transport or walk instead of motor vehicles when traveling (show as Figure 8). According to the analysis results of the causes of smog formation, automobile exhaust is one of the

main causes of smog. Automobile exhaust directly emits inhalable particles into the atmosphere or emits other polluting gases, which chemically reacts in the atmosphere to generate PM2.5 (Zhang, 2019), which leads to air pollution and finally smog weather. Therefore, it is recommended that college students may use public transport or walking to reduce the use of motor vehicles.

Reduce the Use of Disposable Products

69.16% and 53.27% of the people are willing to reduce the use of disposable chopsticks and disposable plastic bags (show as Figure

8) to participate in the prevention and control of smog because the raw materials of disposable chopsticks and disposable paper cups are trees. In addition, according to the analysis results of the perception of smog formation causes, insufficient greening is one of the reasons for smog weather. In addition, if plastic bags are burned, they will produce a lot of harmful smoke and toxic gases, which will also cause great pollution to the atmospheric environment. Therefore, it is recommended that college students reduce the frequency of takeout in their daily life, and bring their own eco-friendly bags when shopping.

■Planting Green Plants

78.5% of the people are willing to participate in the haze prevention and control work by planting green plants (show as Figure 8). Because the desertification of the ground surface causes dust, construction, and road traffic dust, which is also an important factor leading to smog. The dust reduction effect of green trees is very obvious. According to data, the amount of dust floating in green tree belt is much lower than that in non-green open land. Green space can also play a role in reducing dust, and the leaf area of lush turf is more than 20 times of its floor area (Tian, 2019). At the same time, its roots and stems are closely combined with the soil surface to form a ground cover, and it is not easy to generate secondary dust when there is wind, which has a special function for dust reduction. Through the dust reduction effect of green plants, bacteria in the air can be reduced. Therefore, it is recommended

that college students actively participate in public welfare activities such as tree planting in their lives.

■Reduce or Prohibit the Discharge of Fireworks

71.03% of the people were willing to take part in the haze prevention and control work by reducing or prohibiting the discharge of fireworks (show as Figure 8). According to the analysis results of the causes of smog formation, fireworks and firecrackers are also one of the causes of smog, and the discharge of fireworks and firecrackers will produce a large number of harmful gases such as sulfur dioxide, nitrogen dioxide, and carbon monoxide, which will cause respiratory diseases such as tracheitis, acid rain in the air, forest death, crop production reduction or death. The metal chloride powder and harmful gas produced by fireworks and firecrackers will seriously pollute the air, PM2.5 seriously exceeding the standard by tens of times, aggravating the haze. In recent years, many cities in China have issued notices one after another to prohibit the discharge of fireworks, some of which are sub regional and some are completely prohibited. It is not difficult to find that the relevant regulations prohibiting the discharge of fireworks are becoming more and more strict. Therefore, it is suggested that college students should reduce or ban the discharge of fireworks and firecrackers to make their own contributions to the prevention and control of smog.

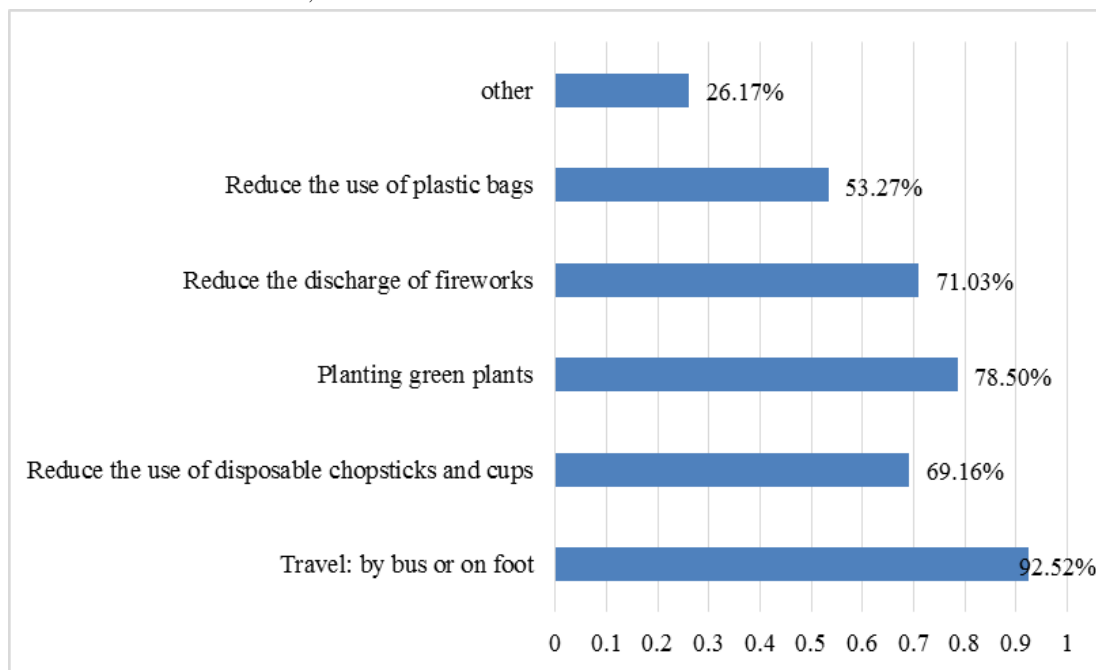


Figure 8. The Statistical Chart of College Students' Participation in Haze Pollution Control

School Response

As the main channel to publicize knowledge about smog, the school has incomparable advantages because students study and live in the school most of the time. However, some schools are still weak in publicizing whether to carry out haze pollution knowledge, and even 59.81% of the survey shows that college students have not carried out haze-related education (show as Figure 9). Thus, 98.13% of college students think that schools need to carry out haze-related education (show as Figure 10). Therefore, it is suggested that schools in this situation should hold relevant activities to carry out smog knowledge education.

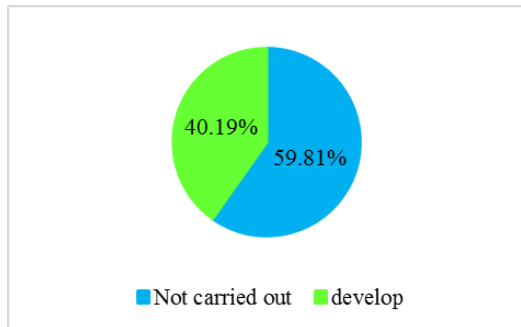


Figure 9. The Statistical Chart of Whether the School Has Carried Out Relevant Education on Smog Knowledge

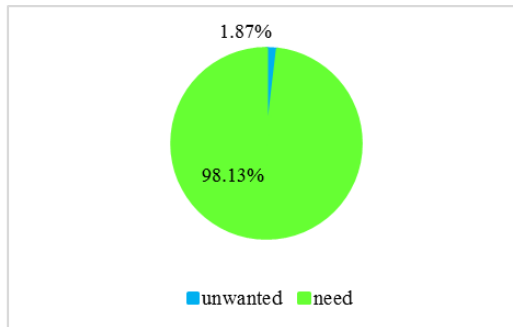


Figure 10. The Statistical Chart of Whether Schools Need To Carry Out Relevant Education on Smog Knowledge

According to the survey data, 69.16% of the students want the school to carry out smog education through various campus activities (show as Figure 11), and 19.63% and 11.21% hope to carry out lectures on smog knowledge and school elective courses, respectively. Thus, it is suggested that schools can hold more campus activities on smog education in various forms so that students can learn about the harm of smog and relevant knowledge of prevention and control measures in the activities. Meanwhile, in combination with lectures on smog knowledge and the setting of elective courses, students can understand smog, strengthen their perception of smog, and improve personal protective measures.

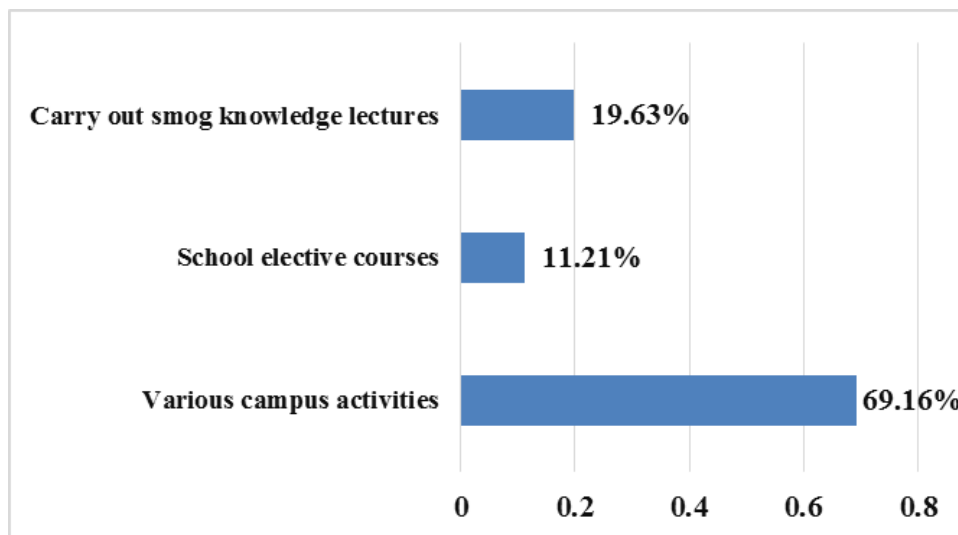


Figure 11. The Statistics of Smog Pollution Education in Schools

The Government's Response

■Formulate Relevant National Laws

According to the survey data, 75.7% of the people think that the government should take measures to revise and improve relevant regulations and standards on smog behavior to control smog (show as Figure 12). In fact, to promote the governance of smog to the level of national will, that is, to show the country's determination to control smog and the seriousness of the smog problem (Zhang, 2019). Therefore, the government should strengthen the legislation and law enforcement of smog control. We should make full use of the legislative experience of foreign countries on smog control, revise the existing relevant laws, and formulate strict smog emission standards. In addition, the relevant regulatory authorities should strengthen the enforcement of laws and regulations, and crack down on illegal emissions in strict accordance with laws and

regulations, so as to improve the deterrent effect of smog control laws and regulations. Meanwhile, the new law should clarify the responsibilities and obligations of the government, enterprises, and individuals in haze control, to distinguish whether the emission behavior of enterprises or individuals is legal, and also improve the legal status of environmental supervision departments, so as to achieve the expected objectives of haze control.

■Enhance Citizens' Awareness of Environmental Protection

77.57% of the people think that the government should strengthen the publicity for environmental protection of smog and improve the public's awareness of environmental protection to control smog (show as Figure 12). Thus, the government should strengthen the establishment of typical demonstration activities, enhance the demonstration effect, make the concept of ecological civilization deeply rooted in the hearts of the people, greatly improve the

awareness of ecological civilization, and advocate the formation of civilized, economical, green and environmentally friendly production consumption and lifestyle. We should establish new media communication channels such as government microblogs, improve the linkage mechanism between environmental complaints and public opinion and law enforcement, implement the government's environmental information disclosure system, and urge enterprises to actively disclose environmental information. In addition, We should give full play to the role of grass-roots party organizations, trade unions, the Communist Youth League, women's federations, schools, and other social groups, and drive all walks of life to pay attention to, support, and participate in the prevention and control of smog pollution through model demonstrations, special activities, exhibitions, job creation, as well as rationalization suggestions and other forms.

■Control the Discharge of Industrial Pollutants

As air pollution caused by industrial pollution is also one of the main reasons for smog, government departments should reasonably plan the industrial structure of cities. According to the survey data, 95.33% of people think that the government should make reasonable planning and adjust the industrial structure layout to control smog (show as Figure 12). Therefore, some factories and enterprises with excessive pollutant emissions should be banned. In practical work, in order to effectively control the discharge of industrial pollutants, industrial enterprises and factories can be built through facility improvement and restriction (Fu, 2014).

■Increase Greening and Improve Energy Structure

Public green spaces are also very important for controlling smog. 72.9% of the people in the survey also think that the government can plant trees and expand the coverage of vegetation because green space is very effective in dust precipitation and reduce smog. Thus, it is necessary to constantly increase the green area to beautify and purify the air and environment. Finally, 82.24% of the people in the survey believe that the government can control smog by improving the energy structure and reducing the use of fossil fuels. Due to the consumption of energy such as oil and coal is also the main source of air pollutants, which mainly include sulfur dioxide and nitrogen oxides. Thus, it is necessary to improve the utilization rate of energy and pay attention to the role of energy conservation and emission reduction (Zhang et al., 2020). Meanwhile, we should also strengthen the development of clean

energy and scientifically and reasonably adjust the energy consumption structure, so as to effectively reduce the emission of industrial pollutants to a certain extent and ultimately improve air quality.

■Strengthen Vehicle Management and Reduce Vehicle Exhaust Emissions

58.88% of the people believed that the government should take strict measures to restrict the driving of vehicles and limit the exhaust emissions of motor vehicles to control smog (show as Figure 12). At present, the implementation of motor vehicle restriction policies by China's municipal governments is divided into single and even day restrictions and tail number restrictions policy. Among them, the tail number of the single and even day restrictions policy is that the single number can travel only in the single number day, while the tail number is that the double number can travel only in the double number day. The single and even number restrictions are policies issued when haze pollution reaches the red warning, with the purpose of reducing the haze more efficiently.

■Control Pollution and Fugitive Dust in Key Industries

76.64% of the people think that the government can control haze by strengthening environmental supervision and management as well as strictly controlling heavily polluting enterprises (show as Figure 12). Thus, the government should speed up the construction of desulfurization and denitrification facilities in key enterprises, strengthen the control of production processes, implement point-to-point fine emission reduction measures, and effectively improve the pollution control technology, equipment, and treatment efficiency of enterprises, guide and standardize the treatment of organic matter in key enterprises.

In the survey, 48.6% of the people think that the government can control the haze by spraying water to reduce dust in a full range, so the government can spray more water on construction sites, roads, and other places to reduce the harm of dust. In addition, the government can set up a link of water spraying to clean tires and chassis at the toll station at the city gate when dusty vehicles outside the city enter the city, when construction vehicles in the city enter the road, the links of covering and cleaning tires and chassis shall be set up.

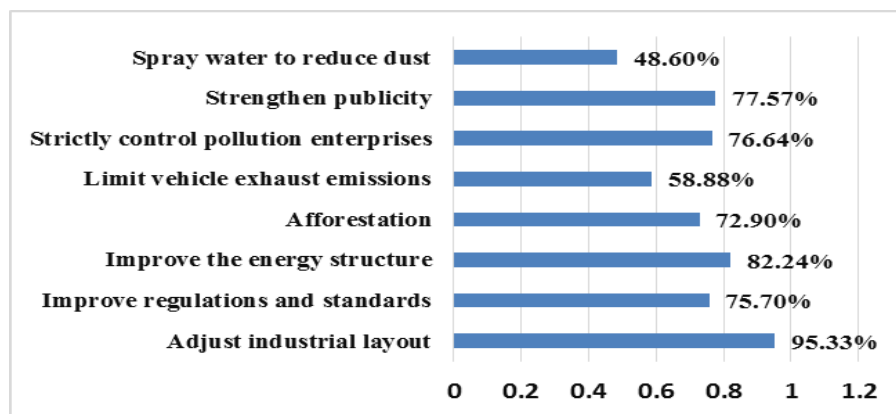


Figure 12. The Survey Statistics of Government's Smog Control Methods

CONCLUSION

From our survey and analysis, this study figure out and summary three conclusions, we describe as follows:

First of all, in the survey of haze perception, most college students believe that the main component of haze is PM2.5. Few people know that the haze material composition also includes PM10. As for the causes of haze formation, most people think that automobile exhaust emission is the main cause of haze formation, followed by the combustion of fossil fuels such as coal, and a few people think that insufficient greening is also one of the causes of haze formation. In terms of the impact and harm of haze, almost all college students believe that haze pollution has the greatest impact on the respiratory system, followed by traffic and traffic accidents. A small number of people believe that haze pollution will affect the reproductive and urinary system, which shows that this small number of college students have a relatively comprehensive understanding of the impact of haze.

Secondly, in the survey of College Students' coping behaviors, it was found that most college students would take measures to reduce the harm of haze to themselves in haze weather, but a small number of college students did not take any protective measures to protect themselves. As for the choice of personal protective measures, most college students choose to wear professional anti-haze masks to reduce the harm of haze when they go out, followed by cleaning their exposed skin immediately after going out, and only a small number of people choose to use air purifiers indoors.

Thirdly, in the investigation of countermeasures and suggestions for haze pollution, the results show that college students can participate in the treatment of haze pollution by changing their travel modes, reducing the use of disposable products, planting green plants, and reducing or prohibiting the discharge of fireworks. Schools can let students know about smog, strengthen their perception of smog and improve their personal protective measures by holding various campus activities, offering elective courses on smog, and giving lectures on smog knowledge. The government can control haze pollution by formulating relevant national laws, enhancing citizens' awareness of environmental protection, controlling the emission of industrial pollutants, strengthening motor vehicle management, reducing vehicle exhaust emissions, controlling pollution in key industries, and dust control.

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REFERENCE

1. Chen, S. Y.; Chen, D. K. Smog pollution, government control, and high-quality economic development. *Economic research*, 2018, 53 (02): 20-34.
2. Dai, X.Y. On smog control and development transformation. *Exploration and contention*, 2013, (12): 70-73.
3. Deng, L. L.; Zhang, K.S. Atmospheric PM (2.5) of typical cities in smog prone areas analysis of metal pollution characteristics and sources in. *Environmental engineering*, 2020, 38 (05): 113-119.
4. Fang, Q.T. We will accelerate the construction of an international science and technology innovation center in the Greater Bay area of Guangdong, Hong Kong, and Macao. *Guangzhou Daily*. 2021, 23 (09): 6-8.
5. Fu, Y. S. Analysis of haze composition characteristics in an area of Shenyang. *Environmental protection and circular economy*, 2014, (12): 57-58 + 75.
6. Gu, K. Y. Environmental concerns, haze pollution and inclusive green growth of Chinese cities. *Xinjiang University*, 2021, 36 (08): 22-44.
7. Guangzhou Statistics Bureau (GSB).Guangzhou 2018 national economic and social development statistical bulletin. *China statistical information network*. 2019, 26 (06): 4-5.
8. Guangzhou Statistics Bureau (GSB). Population size and distribution of Guangzhou in 2019. *China statistical information network*. 2020, 27 (08): 10-11.
9. Guangzhou Municipal People's Government (GMPG). Population and nationality. *Portal website of Guangzhou Municipal People's government*. 2021, 11 (06): 11-12.
10. Han, G. F. The causes of smog and Its Control Countermeasures. *Agricultural Mechanization in Hubei*, 2020, (16): 38-39.
11. Lei, J.N. Guangdong PM (2.5) indoor and outdoor pollution and permeability coefficient research. *Guangdong University of Technology*, 2018, (10): 36-38.
12. Liu, L. F.; Luo, D.M., Research on College Students' environmental education from the perspective of haze cognition. *Journal of Hengyang Normal University*, 2020 (06): 102-107.
13. Shang, Z. H.; Guo, Z. H.; Li, C. H.; Chen, Y. Y.; Chen, X. Y. Comparative study on smog risk perception and acceptability of urban residents – a case study of Guangzhou and Shenzhen. *Environmental Science and Management*, 2020 (07): 7-11.
14. Sun, X. Y.; Zhang, Z. Thoughts on the harm and control of smog. *Scientific and technological horizon*, 2016, (17): 220-221.
15. The State Council (a). Reply of the State Council on the overall urban planning of Guangzhou. *China government*. 2016, 36 (09): 3-7.
16. The State Council (b).Guiding opinions on deepening Pan-Pearl River Delta regional cooperation. *China government*. 2016, (07): 2-7.
17. Tian, L. Thoughts on the prevention and control of smog by green plants. 2019, (16): 38-39.
18. Wang, Z.Y. Research on the impact of haze risk perception on public coping behavior. *Tianjin University of Technology*, 2020 (03).

19. Wang, H. The present situation of smog in China and its control countermeasures. *Leather making and environmental protection technology*, 2022, 3 (02): 100-102.
20. Wu, J. P. Research on the impact path of public smog risk perception on coping behavior intention. Northwestern University, 2020 (07).
21. Yan, X. It is impossible to eradicate the haze in our air if we do not eliminate the haze in our minds. *Internet Weekly*, 2015, (24): 15.
22. Yan, D. First! Sichuan, one of the first "Gigabit cities" in China, holds 4 seats. *Red Star News*. 2021, 20 (06): 22-33.
23. Yang, W.W. Analysis on the causes of smog and Countermeasures. *Environment and development*, 2017, 29 (08): 206 + 210.
24. Zhang, M. j. Study on the responsibility of local government in smog control -- a case study of Chengdu. Southwest Jiaotong University, 2019, (17): 38-39.
25. Zhang, Q. L. Main causes of air pollution haze and its prevention and Control Countermeasures. *Science and technology innovation guide*, 2019, 16 (30): 96-97.
26. Zhang, M. D., Zhang, N., An, C.Y., Li, J.X., Zhao, Z.Y., Zuo, Q. Performance evaluation of government's smog control based on Residents' satisfaction -- a case study of Baoding City. *Rural economy and science and technology*, 2020, 31 (07): 352-353.
27. Zhao, Su. Investigation on haze risk cognition and coping behavior of college students. *Reform and opening up*, 2016 (24): 73-74.