

#### 報告題名: How Much Do You Know About Air Quality?

Research for the air quality in Xitun, Longjing and the

#### neighborhood area

針對西屯區, 龍井區及其鄰近地區空氣品質調查之研

究

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# 目錄

1	中文摘要	1
2	Abstract	2
3	Motivation	3
4	Method	8
5	Results	11
5.1	Section 1	11
5.2	Section 2	16
5.3	Section 3	22
6	Conclusion	25
7	Appendix	27
8	Work Cited	37
	1955	

# 1 中文摘要

我們覺得近年來媒體報導有關空污的數量增加,提高我們對好奇有關空氣污染的資訊。我們查了媒體報導有關空污的數量,發現報導數量確實有上升(數據及分析),我們也找到部分媒體報導民眾咸覺空氣變糟,對於這個部份我們去研究其原因-->可能是因為評估空氣品質的標準改變(pm2.5-->AQI)導致民眾更加敏感。接著我們要做問卷調查來查證報導是不是有誤?我們針對西屯龍井區的民眾做問卷調查,詢問其感受(問卷的結果、分析)。經過問卷分析完後發現民眾覺得其實沒有變差,反而變好(分析:因為媒體報導空污數量變多,所以引起他們的空污關注度,進而增加主動追蹤有關的資訊的頻率及大大改變他們某些生活習慣)。但另一項發現是,居住於西屯龍井區多於五年的民眾對空氣汙染的標準問卷填答正確率與未滿五年的民眾沒有太大差異,因此我們認為媒體報導的增加實際上並沒有改善民眾對於空氣汙染真實的情況的認知。

關鍵字:空汙, 媒體, 感受, 關注, 頻率, 生活習慣

#### 2 Abstract

Our group assumes that the report number of the air pollution from the media has become more and more; it rises up our curiosity for the information about air pollution. Our group collects the report number of the air pollution from Medias, and then we found that it actually becomes more and more, from statistics and analysis aspects. We also found partially citizen feel the air pollution become worse than before. We focus on this part and analyze the cause; maybe it is because of the changing of the way of evaluation on the air quality standard (pm2.5 -->AQI), it becomes stricter and makes the citizens more sensitive. Thus, we will do the questionnaire to realize whether the reports are right or wrong. We focus on the questionnaire about the citizens in Xitun and Longjing Dist., Taichung City by asking their feelings (results and analysis). After analyzing the questionnaire, the data shows that the citizens actually don't feel the air pollution becomes worse than before but feel the air quality becoming better. (Analysis: Due to the amount of the report of the air pollution becoming more and more, the citizens pay more attention to the air quality. Further infects their frequency of following these kinds of information actively and obviously changing their lifestyle. However, we found that the rate of right answer for the standard of air pollution filled by people live more and less than five years in Xitun and Longjing Dist., Taichung City are almost the same. Therefore, we believe that the increasing amount of news about air pollution didn't improve their right cognition about the real conditions of air pollution.

Keynote: air pollution, media, feelings, attention, frequency, and lifestyle.

# Motivation



Figure 2 News report about air pollution in Taichung

From the figure1 and 2, the citizens receive these kinds of reports from the media has become more and more in recent years. In these few years, the amount of news about air pollution are largely increasing, so we associate this phenomenon with "deterioration of air pollution" in our homeland. In the meanwhile, it kindles our curiosity about the differences between news and reality. That's our motivation to do this research. First, we want to know whether the news about air pollution concerned has truly increased or not within these 10 years, and how it changes to a certain extent. In addition, some people says that the change of air quality standard make us be alert to the condition of bad air contamination. Second, we decide to count the amount of the internet reports about air pollution on three noticeable medium including "The Liberty Times", "United Daily News" and "Apple Daily News" because these three medium has high market share. We type air pollution down on the search engine of each website of them.

自一力一号一派端午佳節愉快	即時新聞▼	報紙總覽▼	影音	娛樂	汽車	時尚	體育	3C	 評論	<sup>壹北市 2</sup> 玩咖	:6-29 ℃ 食譜	(健康
查詢結果												
關鍵字查詢:	空氣汙染			(最多	三組關	鍵字)	•	AND	0	OR		l
日期: 2018 (	<ul> <li>年 3 </li> <li>每次查詢區間最長</li> </ul>	月 20 🔻	日 ~ 2005 年	20 1月1日	18 ▼ ∃ ~ 20	_ 年 05年3	6   • 月 31 [	<b>,</b> 月 目)	18	▼ 日		
										查詢		
言論 2018-06-13 10:3 自由開講》「中電□	37 中用」搭配「着	F慧區域電網」	政策	具體可	行							

Figure 3: use the search engine to count the amount of news report about air pollution



And then we sum up the total of the news of each three.

Figure 4: the amount of news about air pollution indeed immensely escalating from 2008 to 2017

	聯合新聞 網	自由時報 電子網	蘋果日報	《密言十
2017	940	188	251	1379
2016	88	179	182	449
2015	106	133	194	433
2014	53	90	109	252
2013	23	35	25	83
2012	15	19	5	39
2011	17	16	8	41
2010	15	13	1	29
2009	10	5	0	15
2008	0	4	0	4

Table 1: the amount of news about air pollution each year

According to the Table 1, there are only four reports about air pollution in 2008. The news in 2013 is twice of the amount in 2012 and the amount in 2014 is three times as much as that in 2012. It apparently proves that the amount of news about air pollution indeed immensely escalating from 2008 to 2017 as you can see on the figure 3 and figure 4. We discover the most distinctive board is between 2013 and 2014. 252 reports in 2014 far prevail over 83 reports in 2013. Therefore, we divided the data into two groups, you can see it from figure 5, one is from 2008 to 2012, and the other is from 2013 to 2017, five years before and after. It proves that the amounts of news about air pollution are largely increasing within these five years.



Figure 5: the amount of news about air pollution 5 years before and after

On the other hand, according to The Epoch Times has reported "we focus on PM2.5 index to evaluate the air quality. Since the standard changed from PM2.5 to AQI, the air quality index, we will take emergency response into action once PM2.5 excesses over 35 micrograms to prevent the air quality from getting worse. In addition, the amount of news report about air pollution has been growing; therefore, the public are alert to related news and consider air quality are deteriorating". We focus on this part and seek for the provability. We figure out a reliable source to support what the news announces. According to Executive Yuan, "Environmental Protection Administration solemnly declares that once the air quality excesses the standard, AQI>100 (the 24-hour average of PM2.5 exceeds 35 µg/m3), they will take appropriate measures such as help reduce the amount or do some precaution. In the meanwhile, we also strengthen the inspection on high-contaminated old car to avoid the deterioration of air pollution. Compared to 'purple explosion(the 24-hour average of PM2.5 reached 71 µg/m3)', the management is more active". Therefore, the announcement of official proves what The Epoch Times has reported about the change of air quality standard is accurate.

Our hypothesis that there are increasing amount of news about air pollution within these five years has been proved by our collective data, form and graph. In addition, we figure out a news reported by The Epoch Times has the same perspective as us. Moreover, we endeavor to look for something more persuasive and convincing sources that Executive Court's fully manifest our hypothesis as well. Next, to make our survey more precisely, we decide to ask people live in Xitun District and Longjing District to fill in the questionnaire about their personal feeling about the air pollution before and after because we want to know the effects of the air pollution are serious or slight and what kinds of things would be affected by the air pollution, for example, the habits and lifestyle. Maybe we thought the air quality is bad, but actually the air

7

quality is becoming better and better. Or, we thought the air pollution is not so bad, but it becomes very serious in fact. Our group wants to further analyze the data we collected and the information we found in order to know the differences between the fact and feelings of the citizens.

# 4 Method

Method is the overview of our research design, we used two ways to further analyze and combine the data together: One is collecting the data of the air quality in Taichung, another one is releasing our questionnaire to the people who live in Taichung. The charts below are the data of the air quality in Taichung.





Figure 6 : the air quality in Taichung area in recent 7 years. (Including 豐原, 沙鹿, 大里, 忠明, 西屯)

According to the figure 6, it shows that the air quality on Xitun, Taichung area in recent 7 years. The colors represent the air quality are good or bad. The green color means that the air quality is extremely good. Then, the yellow and red color means that the air quality is normal and bad. Last, the purple color represents the air quality is extremely bad. In short, from the figure 6, we can figure out that the air quality is actually becoming better in these years.

After understanding the hypothesis of the thesis, the method we chose is giving out the questionnaire. After receiving the data from the residence, we started to analyze the data and try to find out whether the result is corresponded to the hypothesis. We decided to show the data in three ways, the first one is the original data, the second one is that we divided them into two groups according to the place they live, and the third one is that we divided them into two groups according to the time length of residency. As for our questionnaire, we released our questionnaire to the people who live in Taichung by Google Form, there are 200 participants in our questionnaire. The ages of participants are 10-19 years old, 20-29 years old, 30-39 years old, 40-49 years old, 50-59 years old, 60 years old or older. Our survey focused on the understanding of issues related to air quality, and the residents of the adjacent areas of Tunghai University (Xitun and Longjing). The total number of questions are 27, we divided our questionnaire into four parts: There are 4 questions in the first part, are about to survey peoples' personal information; There are 5 questions in second part, are about to survey peoples' understanding of air quality related indicators; There are 12 questions in third part, are about to survey whether the air quality has affected their lifestyle and peoples' feelings; There are 6 questions in fourth part, are about to survey the feelings of residents who have lived for more than five years. Only those who have lived in Taichung for more than five years need to fill this part.



#### **5** Results

Results are about the comparisons and explanations of our research questionnaire. We divided them into 3 parts. There are section 1, the result from analyzing the original data; section 2, the result we get from comparing the data divided by the length of residency, and section 3 the result of the comparing analysis after separate the data according the place of residency.

#### 5.1 Section 1

In Part 2 of the questionnaire, we try to find out how well people understand the knowledge concerned with air quality. By observing the rate of correct answer, we'll see the result clearly.





As figure 7 shown above, most of the people understand some indexes that frequently appear on the news. However, the numbers of getting wrong on the 4<sup>th</sup> question and the 5<sup>th</sup> question are obvious. According to our research, it is because the media keep exaggerating the term "紫爆" that makes people have a wrong image on question 4. At the 5<sup>th</sup> question, most of the people believe that CO2 and CFCs are included in the AQI. Combined with the result our team have from the questionnaires,

we realize although people pay a lot of attention to the issue, but they don't understand the issue thoroughly and only read the information by the media.

Part 3 of the questionnaire tries to understand the feeling towards air quality of the residence in this area.

Table 1

Questions	Average answer		
How do you feel about the air quality around Tunghai area?	1.93 (from the scale1~5, 1:very bad, 5:very good)		
How often do you wear a mask when you go out?	2.86 (days in one week)		

As table 2 shown above, the residence indeed think the air quality is bad in this area. The result is corresponded to our hypothesis.

As table 2 shown above, most of people still don't have the habit of wearing mask when going outside all the time.



Figure 2 The frequency of having exercise in a week. (Top part: Frequency in the past. Bottom part: Frequency nowadays.)

Figure 8 tells that the residence living in this area reduce the day they choose to go exercise. The air quality indeed changes the habit of doing outdoors exercise.



Figure 9 Do you watch the information of air quality?

As figure 9 shown above, most of the people watch the information of air quality. The severe phenomenon indeed raises residence's attention on this issue, almost 70% of people start to care about the issue.

Table 2

Question	Answer
How many days do you watch the information of air quality in a week?	4.59 (days in one week)

As table 3 shown above, people have built up the habit of checking the information of air quality and they do with a very high frequency. It shows that people nowadays pay a lot of attention to this issue.



Figure 10 Resource people use to get the information of air quality.

As figure 10 shown above, most of people don't read the information on the newspaper, the frequency of other items has become higher.

Table 3

Question	Answer
Do you think the current air quality affects	3.68 (from the scale1~5 to rate the
your daily routine?	agreement)
Do you think the current air quality affects your	4.15 (from the scale1~5 to rate the
health?	agreement)

As the table 5 shown above, the tendency of agreeing on this topic, compared to the next topic, is not that obvious. But the data shows people indeed care about that the air quality will hurt their health.

The numbers in table 5 show the tendency of agreeing on this topic is tremendously obvious – almost everyone agrees the air quality is hurting our health.

In the 4<sup>th</sup> part of the questionnaire, only those who live in this area for longer than 5 years have to answer this part. Part 4 tries to find out how they reacted or felt five years ago. Our research intends to understand the feelings and behaviors of them from five years ago.



Figure 11 People live in Tunghai area for over/under five years.

From the data of the questionnaires, we have 28% of people living longer than

5 years and the rest of them are relatively new to the city.



Only 45% of the people watched information of air quality in the past. Compared

to the data in figure 9, people nowadays have more attention on this issue.

Table 4

Question	Answer
Was the air quality better five years ago?	2.67 (from the scale1~5, 1:wors, 5:better)
Do you think the air quality affected your	2.30 (from the scale1~5 to rate the
daily routine five years ago?	agreement)
Do you think the air quality affected your	2.63 (from the scale1~5 to rate the
health five years ago?	agreement)

Compare to Figure7, the feeling is corresponded to the actual situation, meaning when the air quality becomes worse, people living in the area have the sense about it.

From table 6, we see that people didn't feel the issue is severe to their body, and the result of the research shows it's because people nowadays care about air quality more.

#### 5.2 Section 2

Then our research team divides the group into two groups according to the time length of the residency. The gate is set at 5 years. Only those who live here longer than 5 years have to do Part 4. Let's see what's the difference between the two. We'll scan the whole result by the order of the questions in the questionnaire. During the research and comparison, we noticed some notable features.

Part 2 of the questionnaire tries to find out how well people understand the knowledge concerned with air quality. By observing the rate of correct answer, we'll see the result clearly.





(See the whole part of questions in Appendix 1.)

As the figures shown above, the ratio of correction on every question has no significant difference in terms of time length of residency. It shows the knowledge the two group have is similar to each other.



Figure 14 The frequency of having exercise in a week.

Our data shows that those who live over five years have already built up the habit of wearing a mask when going out. However, the group of under five years have obvious less day than the other group.



Figure 15 The frequency of having exercise in a week.

As the figure 15 shown above, the number of days in exercise change more dramatically for those who live under five years.



In figure 16, it's clear that those who live over five years watch the information

of air quality more. They pay more attention to their surroundings.





Figure 17 The average score of question 4-5. (Q4-5: Do you think the air quality affected your daily



Figure 18 The average score of question 4-6. (Q4-6 Do you think the air quality affected your health

five years ago?)

As figure 17 and figure 18 shown above the group over five years shows less concern on the effect of air quality to their daily life and health. It's because they have more attention to their living environment and they think they have less danger in such air condition.

For the result in the Part 3 of the questionnaire, the data shows those who live under 5 years react more dramatically on the issue and tend to show their concern on the behavior. For the other group, our research will find out the reason behind the difference on the behavior of the two. In the following paragraph, we list out some interesting result corresponding to the phenomenon mentioned above.

In the 4<sup>th</sup> part of the questionnaire, only those who live in this area for longer than 5 years have to answer this part. Part 4 tries to find out how they reacted or felt five years ago. Our research intends to understand the feelings and behaviors of them from five years ago.



Figure 19 How many days did you watch the information of air quality?

The number of days slightly reduced from five years ago, but they're still tracking the information for almost 4 days a week. It shows they keep the habit of caring about the air quality and never lose the attention on the issue.



It's clear that they believe the air quality is better now. People have an optimistic



attitude on the change of the air quality.

Figure 21 Do you think the air quality affected your daily routine five years ago?



Figure 22 Do you think the air quality affected your health five years ago?

As the figure 21 and 22 shown above, they agree that the air quality is better now, and it fits our research on the data collected from source.

#### 5.3 Section 3

Our research team also divides the received questionnaire into two groups according to the place of the residency. This approach aims to find out if there's any difference between the groups when they are filling in the questionnaire. We scan the whole result by the order of the questions in the questionnaire. During the research and the comparative analysis, we notice some notable features. The comparing result we find within the usable data, 167 participants are from the Tunghai area; 29 participants are from outside of Tunghai area, but are mostly from the nearby area. The two groups are quite disparate and difficult to compare base on their number. Because of that, we compare them by transferring the data into percentage, average number or presenting the data in pie charts to make the comparing process easier.

The following paragraphs are the more noticeable results we get from the comparing analysis from part 2 to part 4 of the questionnaire.

In part 2 of the questionnaire we try to find out how well people understand the Knowledge concerned with air quality. By observing the rate of correct answer, we'll see the result clearly.



Numbers of people having correct answer on questions in the part 2 of the questionnaire. (See the whole part of questions in Appendix 1.) The two groups of residents are performing pretty much the same.

As we can see in figure 23, the difference between the correct rates of the two groups is minor. Because of that, we can state that the residents' understanding towards air quality don't differ because of the place of residency.

#### Table 5

Questions	Average answer
How do you feel about the air quality	(from the scale1~5, 1: really bad; 5really
around Tunghai area?	good)
Not in Tunghai area	2.28
In Tunghai area	1.87
How do you feel about the air quality	(from the scale1~5, 1: much worse than
around Tunghai area five years ago?	now; 5: much better than now)
Not in Tunghai area	3.21
In Tunghai area	2.36

The residents who don't live in Tunghai area are holding more positive opinion toward the air quality in Tunghai.

However, from the information we get from the questions about the cognition and the overall reaction towards air pollution, we find that the difference of the two groups is minimal and is in the tolerance rage. Because of that, we can tell the two results that we mentioned, as table 7 shown above, are just the residents' subjective ideas toward the air quality in Tunghai area. And for the other questions, their answers remain the same.

To conclude this part, we can't see significant and consistent difference on every topic in the questionnaire. Because air pollution is a continuous geographical phenomenon, the overall result of comparing analysis shows that the distribution of the questionnaire is not broad enough to see the different answer by the participants in different residency.

#### 6 Conclusion

In terms of the reflections of the air quality on peoples' lives, as the figure 17 and figure 18 shown above, we can see that the people who have lived near  $\bar{\pi}$  for more than 5 years react calmer than that of less than 5 years. Also, the people who have lived near  $\bar{\pi}$  did preventive measures better than that of less than 5 years. They tend to wear the mask before going outside, and spent time focusing on the news of air quality more often.

As figure 23 shown above, we can see that there is no big difference of their knowledge understanding on air quality between the people who lived in  $\pi$ area and the people who lived outside  $\pi$ area. It can be explained that the place of residency has nothing to do with their knowledge understanding of air quality.

Plus, as figure 20 shown above, people who have lived near 東海 area surely think that the current air quality is better, it can be realized that because they have lived for a long time, they realized the knowledge of air quality more.

Moreover, as figure 4, figure 5, table 1, figure 9, figure 10, figure 12 shown above, we can see that the media reports of air pollution news have increased. It can be proved that people have put so many attentions on the air quality because recently the media reports of air pollution news have increased, it has caused people's attention to air pollution and increased the frequency of actively tracking relevant information. It can be affirmed that the social media have set the trend to lead public's opinions in order to make it a great sensation, and this has also affected people's habits very much.

However, compared to the people who have lived near 東海 area less than 5 years, the people who have lived for more than 5 years react calmer than that of less than 5 years. It can be explained that because the people who have lived in 東海 for long time, they would not change their habits often. Of course they will still do preventions because they know the air quality is bad now. But for the people who have lived less than 5 years, they don't actually realize well.

In our conclusion, based on our combination of the supporting evidence, we consider that the social media have affected people's habits and thoughts very much. They truely got a lot of information of air quality from the media, changed their habits, and increased the frequency of their attentions on air quality. But actually, the information of air quality that the media gave, doesn't make people have more understanding on this issue.



## 7 Appendix

# 東海大學鄰近區域空氣品質調查

您好!我們是來自東海大學的研究團隊,首先威謝您顏意擬空績寫這份問卷。

以下問題,主要針對東海大學鄰近區域(四屯、龍井一帶)的居民,對於空氣品質相關問題的理解進行調查。

這份問卷中所提供的資訊,僅做為學術研究用途,不會提供給其他單位,請要心填寫1您的意見對我們的研究相當重要,在 填寫時,請依照自身的秋況、實際感受及認知作答1最後,誠摯感謝您的協助和合作,祝黃好的一天。





Part 2: About to survey peoples' understanding of air quality related

indicators

第二部分主要調查您對於空氣品質相關指標的知識,請依自身理解程度做填寫。

1. 我知道環保署目前將空氣品質分為幾個層級?\*

- 〇 4個
- 5個
- ()6個
- 7個

2. 依照環保署的空氣品質分級,下列哪個顏色代表空氣品質為「良好」?*
○ 緑色
○ 黃色
○ 白色
<ol> <li>依照環保署的空氣品質分級,下列哪個顏色代表空氣品質為「對敏感族群不*</li> <li>健康」?</li> </ol>
○ 黃色
○ 紅色
◎ 橋色
○ 紫色
4. 依照環保署的空氣品質分級,下列哪個顏色代表空氣品質為「危害」?*
○ 白色
○ 紫色
○ 褐色

5. 請問環保署目前將哪幾項汙染物列為空氣品質(AQI)的指標?(可複選	) *
一氧.化碳 (CO)	
二氧化碳 (CO2)	
二氧化硫 (SO2)	
二氧化氮 (NO2)	
臭氧(03)	
細微懸浮粒 (PM2.5)	
懸浮微粒 (PM10)	
氟氯碳化物(CFCs)	
其他	

**Part 3**: About to survey whether the air quality has affected their







9. 我取得空氣品質資訊的管道 (請依按參考頻率做選擇)



33



Part 4: About to survey the feelings of residents who have lived for more than five years. (Only those who have lived in Taichung for more than five years need to fill this part.)

第四部份問題與第三部分相似,但煩請居住5年以上的居民做填寫,其他受訪者可直接跳過這個部分。

1. 以前有無關注生活區域空氣品質的習慣?

) ž

否(還否者,號通02.03,直接跳到04作答)

2. 我以	前一周關	注空氣品	價的天	數為?				
	0	1	2	3	4	5	6	7
	0	0	0	0	0	0	0	0
3. 印象	中,我取	得空氣品	品質資訊	的管道(	請依按	參考頻率	<sup>医</sup> 做選擇)	
		極低		低	普	通	高	極高
電視新聞		$\bigcirc$		0	C		$\bigcirc$	$\bigcirc$
網路社群		$\bigcirc$		0	C		$\bigcirc$	$\bigcirc$
報紙		$\bigcirc$		$\bigcirc$			$\bigcirc$	$\bigcirc$
他人告知		$\bigcirc$		0	C		$\bigcirc$	$\bigcirc$
手機APP		$\bigcirc$		0	C		$\bigcirc$	$\bigcirc$
自己觀察		$\bigcirc$		0	C	) ()		$\bigcirc$
其他 <mark>(</mark> 若無則	可按極	$\bigcirc$		0	C	0 0		$\bigcirc$
4.印象	⊉,五年	前的空氣	品質與	現在相比	t?			
		1	2	ŝ	3	4	5	
明顯	較差	0	0	(	)	0	0	明顯較好



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