出國報告書

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投稿論文名稱：The Association Between Environmental Factors, weather and Light, and Traffic Accidents in Taiwan.
摘要：

Introduction: Traffic accidents was the most overlooked leading cause of death. Environmental factors such as weather influenced by climate change and visibility affected by air pollution, may play crucial roles in traffic accidents. The present study is to examine whether there are differences in injury severity and road user categories in traffic accidents under different weather and light conditions.

Methodology: We obtained the 2020 Road Traffic Accident Investigation Report and established the database focusing on the first parties involved. Excluding passengers, drunk drivers, and unlicensed drivers. Chi-square analysis was used to examine differences of injury severity, road user categories in different weather and light conditions in Taiwan.

Result: As to weather, the highest injury rate was in strong wind, while fog-or-smoke led to the second-highest injury rate and the highest fatality rate. Among road user types, it was revealed that only under fog-or-smoke showed the significantly higher proportion of car and pedestrian when compared to sunny day. During dawn and dusk, accidents have significantly higher fatality and injury rates than natural light, and the proportions of injuries for cars, bicycles, and pedestrians were significantly higher. In nighttime or limited spaces, non-illumination exhibited significantly higher accident fatality and injury rates than illuminated, and the proportion of car accidents in non-illumination was significantly higher. Regardless of any weather and light conditions, motorcycle accidents consistently resulted in the highest fatality and injury rates.

Conclusion: Traffic accidents in strong winds, fog-or-smoke, and during slanting sunlight, are more likely to cause injuries and death. The increased injuries in different road user types under specific weather or light conditions.

Contribution of the Study: This study clarifies the differences in the distribution of injuries during weather and light conditions in Taiwan. we should further explore the environmental changes caused by climate change or worsening air pollution.

壹、 心得分享

能夠參加 2024 年 ISEE-AWPC 和 ISES-AC 聯合會議，對我而言是一個既興奮又具有挑戰的全新體驗。這是我首次離開台灣參與學術研討會，並且我的投稿論文能夠通過審核，讓我倍感榮幸。這場為期四天的會議匯集了來自全球的研究人員、政策制定者以及環境與健康領域的專業人士，共同探討如何應對亞洲的環境健康挑戰。

會議討論主題圍繞氣候變遷對人類健康的深遠影響展開。隨著極端氣候日益頻繁，環境污染對疾病的影響已成為全球關注的焦點。無論是綠色能源的推廣，還是永續生活模式的實踐，都是緩解這些威脅的重要方向。我在多場報告中接觸到大量最新的研究成果與數據分析，特別是環境污染與健康風險交叉領域的討論，深刻啟發了我對自身研究的思考。這場會議不僅鞏固了我對研究方向的信心，也讓我更加理解這些議題的重要性與緊迫性。

這是我第一次離開台灣參加的學術研討會，在此之前，我從未如此深刻地意識到，親身走出國門、與世界接軌是多麼重要的一件事。在旅途中，我不僅見識了不同文化的多樣性，也開始反思過往的思想框架，發現自己過去的思維方式是如此狹隘且局限。這次機會幫助我重新審視自己的研究方向，也激勵我在學術追求中更加開放包容。與會者的背景涵蓋各個學術領域，既有備受尊敬的資深學者，也有初露鋒芒的青年研究者。儘管膚色、文化和語言各不相同，但每位與會者都展現了對環境與健康議題的深刻關注。會議期間，我有幸聆聽了多位專家分享最新的研究成果，特別是在環境污染、氣候變遷以及健康威脅的交叉領域，他們的見解與數據啟發了我對研究問題的更深層思考。我也深刻體會到，環境與健康議題已不僅僅是學術層面的探討，更是全球共同面臨的挑戰。未來，我希望能以更加宏觀的視角和更加細緻的研究，為這個領域的進步做出自己的貢獻。
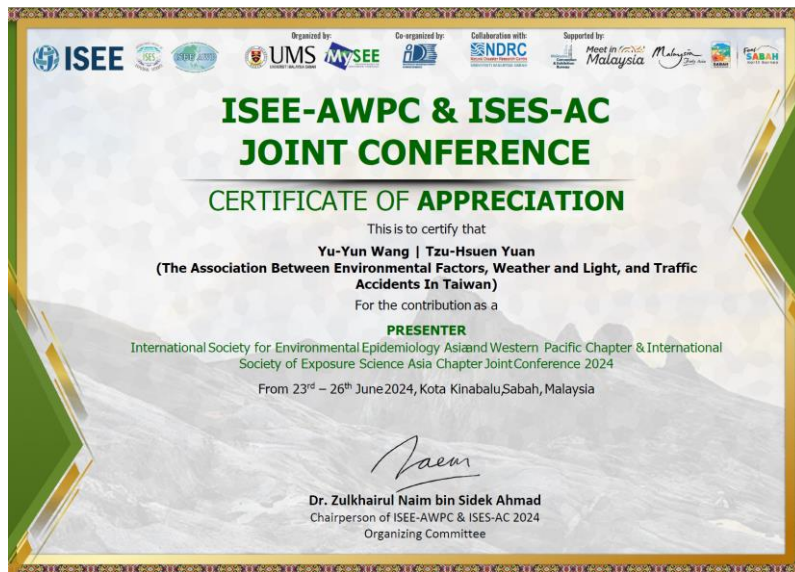
貳、 活動照片

Figure 1　ISEE-AWPC & ISES-AC 發表證明

Figure 2 ISEE-AWPC & ISES-AC **one-minute presentation**
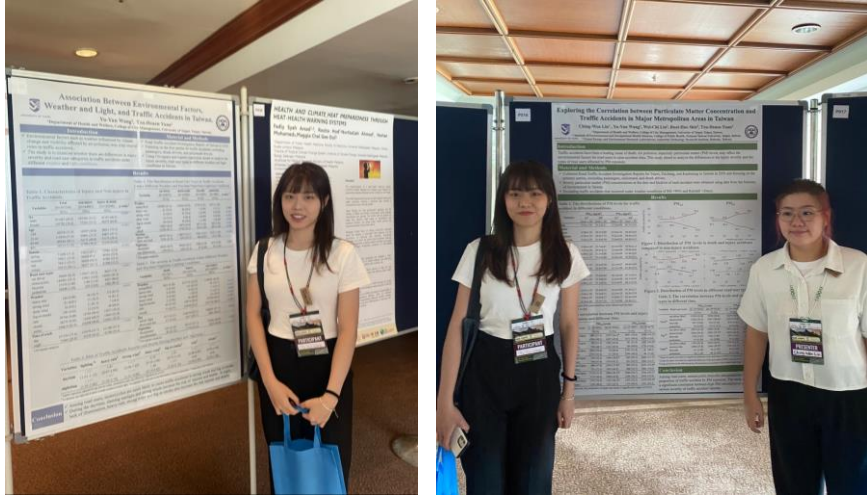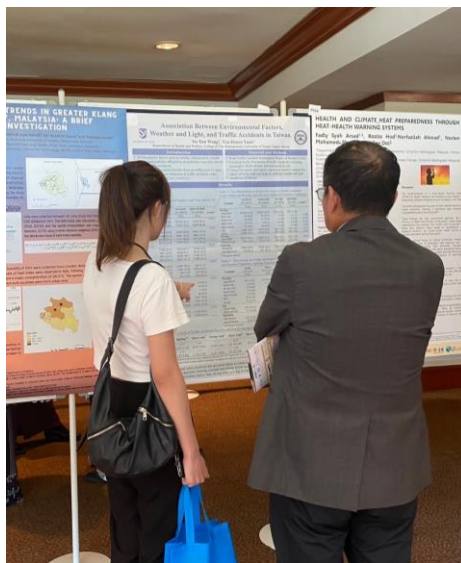
Figure 3、4 參與研討會照片

Figure 5 會議照片

Figure 6 分享海報照片

Association Between Environmental Factors, Weather and Light, and Traffic Accidents in Taiwan.

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Introduction

- ✓ Environmental factors such as weather influenced by climate change and visibility affected by air pollution, may play crucial roles in traffic accidents.
- ✓ The study is to examine whether there are differences in injury severity and road user categories in traffic accidents under different weather and light conditions.

Material and Methods

- ✓ Road Traffic Accident Investigation Report of Taiwan in 2020.
- ✓ Focusing on the first parties for traffic accidents, excluding passengers, drunk drivers, and unlicensed drivers.
- ✓ Using Chi-square and logistic regression model to analyze the injury severity, road user types in different weather and light conditions in Taiwan.

Results

Table 1. Characteristics of Injury and Non-injury in Traffic Accidents.

Variables	Total (N=307249) N(%)	non-injury (N=144903) N(%)	injury & death (N=162346) N(%)	p-value[a]
Sex				<0.001
male	201467 (65.6)	107700 (53.5)	93767 (46.5)	
female	105782 (34.4)	37203 (35.2)	68579 (64.8)	
Age				<0.001
<24	66358 (21.6)	16347 (24.6)	50011 (75.4)	
25-44	115434 (37.6)	60601 (52.5)	54833 (47.5)	
45-64	89344 (29.1)	54171 (60.6)	35173 (39.4)	
65+	36113 (11.8)	13784 (38.2)	22329 (61.8)	
Season				<0.001
spring	71800 (23.4)	33812 (47.1)	37988 (52.9)	
summer	76821 (25.0)	36436 47.4	40385 (52.6)	
fall	78413 (25.5)	36428 (46.5)	41985 (53.5)	
winter	80215 (26.1)	38227 (47.7)	41988 (52.3)	
Road user types				<0.001
car driver	78494 (42.0)	119437 (92.5)	9635 (7.5)	
motorcyclist	184991 (53.3)	23863 (14.6)	140022 (85.4)	
bicyclist	27370 (3.40)	1180 (11.4)	9207 (88.6)	
pedestrian	28498 (1.30)	423 (10.8)	3482 (89.2)	
Weather				<0.001
heavy rain	180 (0.06)	66 (36.7)	114 (63.3)	
strong wind	91 (0.03)	17 (18.7)	74 (81.3)	
dusty wind	18 (0.01)	11 (61.1)	7 (38.9)	
fog-or-smoke	100 (0.03)	32 (32.0)	68 (68.0)	
rain	29766 (9.69)	14749 (49.5)	15017 (50.5)	
cloudy	28275 (9.20)	13630 (48.2)	14645 (51.8)	
sunny	248819 (81.0)	116398 (46.8)	132421 (53.2)	
Time of crash				<0.001
day	231554 (75.4)	110374 (47.7)	121180 (52.3)	
night	75695 (24.6)	34529 (45.6)	41166 (54.4)	

[1] Chi-square analysis.

Table 2. The Distribution of Road User Types in Traffic Accidents Under Different Weather and Daytime/Nighttime Lighting Conditions.

Variables	car driver (N=129072) N (%)	motorcyclist (N=163885) N (%)	bicyclist (N=10387) N (%)	pedestrian (N=3905) N (%)	p-value[a]
Weather					
sunny(Ref)	103040 (41.4)	134024 (53.9)	8778 (3.53)	2977 (1.20)	
heavy rain	81 (45.0)	90 (50.0)	7 (3.89)	2 (1.11)	0.769
strong wind	19 (20.9)	67 (73.6)	5 (5.49)	0 (0.00)	<0.001
dusty wind	10 (55.6)	8 (44.4)	0 (0.00)	0 (0.00)	<0.001
fog-or-smoke	38 (38.0)	58 (58.0)	1 (1.00)	3 (3.00)	0.163
rain	13685 (46.0)	14876 (50.0)	667 (2.24)	538 (1.81)	<0.001
cloudy	12199 (43.1)	14762 (52.2)	929 (3.29)	385 (1.36)	<0.001
Daytime					
nature light	94787 (42.4)	118837 (53.1)	7636 (3.41)	2347 (1.05)	<0.001
dawn and dusk	3258 (41.0)	4191 (52.7)	366 (4.61)	132 (1.66)	
Nighttime					
illuminated	29828 (40.9)	39426 (54.1)	2288 (3.14)	1372 (1.88)	0.053
non-illumination	1199 (43.1)	1431 (51.5)	97 (3.49)	54 (1.94)	

[a] Chi-square analysis.

Table 3. The severity in Traffic Accidents Under Different Weather and Daytime/Nighttime Lighting Conditions.

Variables	death (N=767) N(%)	injury (N=161579) N(%)	non-injury (N=144903) N(%)	p-value[a]
Weather				
sunny(Ref)	645 (0.30)	131776 (53.0)	116464 (46.8)	
heavy rain	0 (0.00)	114 (63.3)	66 (36.7)	0.018
strong wind	0 (0.00)	74 (81.3)	17 (18.7)	<0.001
dusty wind	0 (0.00)	7 (38.9)	11 (61.1)	0.470
fog-or-smoke	2 (2.00)	66 (66.0)	32 (32.0)	<0.001
rain	43 (0.10)	14974 (50.3)	14749 (49.5)	<0.001
cloudy	77 (0.27)	14568 (51.5)	131776 (48.2)	<0.001
Day				
nature light	477 (0.21)	116439 (52.1)	106691 (47.7)	0.004
dawn and dus	27 (0.34)	4237 (53.3)	3683 (46.3)	
Nighttime				
illuminated	243 (0.33)	39165 (53.7)	33506 (46.0)	<0.001
non-illuminat	20 (0.72)	1738 (62.5)	1023 (36.8)	

[a] Chi-square analysis.

Table 4. Risk of Traffic Accidents Injuries and Deaths During Daytime and Nighttime. [a]

Variables	lighting[bc]	heavy rain[d]	strong wind[d]	dusty wind[d]	fog-or-smoke[d]	rain[d]	cloudy[d]
daytime	1.06* (1.01-1.12)	1.41 (0.97-2.04)	4.02* (2.06-7.85)	0.34 (0.10-1.08)	1.24 (0.72-2.14)	0.90* (0.88-0.93)	0.96* (0.93-0.99)
nighttime	1.53* (1.41-1.66)	1.96* (1.03-3.76)	3.57* (1.41-9.00)	1.36 (0.19-9.82)	3.80* (1.65-8.74)	0.94 (0.90-0.99)	0.96 (0.92-1.00)

[a] logistic regression adjusted for age and sex using, presented as odds ratio (95% CI). * significant by p<0.05.
[b] In daytime, the odds ratio is dawn or dusk compare to nature light. [c] In nighttime, the odds ratio is non-illumination compare to illuminated. [d] Using sunny as the reference.

Conclusion

- ✓ Among road users, motorcyclist are more likely to cause traffic accidents in strong winds and fog or smoke.
- ✓ During the daytime, slanting sunlight and strong winds increase the risk of injuries and deaths. At night, lack of illumination, heavy rain, strong wind and fog or smoke also increase the risk injuries and deaths.

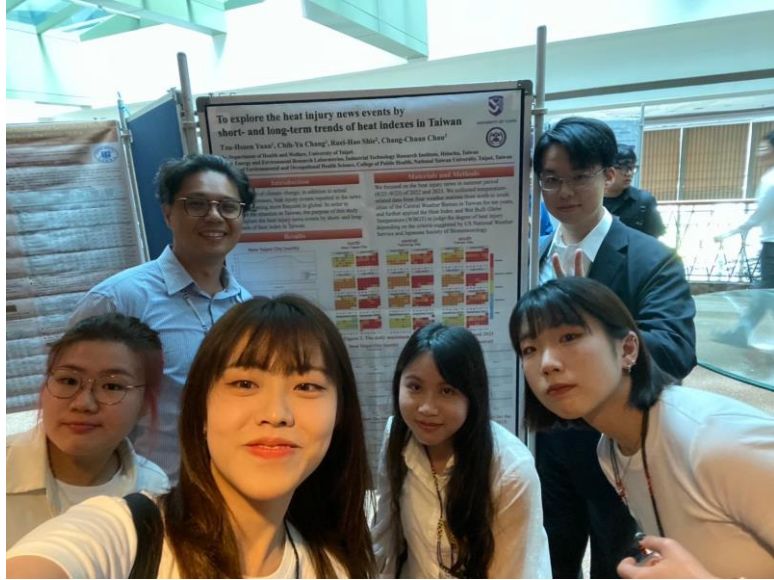Figure 7 The Association Between Environmental Factors, Weather and Light, and Traffic Accidents in Taiwan. **Poster1**

Figure 8　跟指導老師的海報合照

Figure 8　參觀沙巴大學清真寺