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Assessing Hazardous Urban Trees: Insights from Public Perspectives

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Abstract

Despite the extensive research conducted on urban trees, little is known about the differing perspectives on hazardous trees between the public and experts. Evaluating and mitigating hazardous trees is crucial, as poor decisions can result in property damage, injury, or loss of life. The primary goal of this study is to understand how experts and general public perceive dangerous trees in order to establish more effective strategies for reducing the hazards associated with urban trees. The standard tree hazard evaluation practiced by experts, along with a survey of public respondents evaluating tree hazards is analysed quantitively. Tree species, tree target, site factor, tree health, load factor, and tree defect are the six main factors that experts consider when evaluating dangerous trees. On the other hand, only four were highlighted by the public: site factor, tree health, load factor, and tree defect. The results provide insightful information that assists tree managers in establishing feasible strategies for reducing the risks associated with urban trees.

Keyword: Hazardous Trees, Tree Risk Management, Urban Tree Evaluation.

INTRODUCTION

The knowing how to recognise a dangerous tree is beneficial for property owners, public safety, and averting possible accident or damage. Arborists, horticulturists, and urban foresters are among the tree management professionals who are well versed in and generally accept specific knowledge and practices for identifying hazardous trees thematic approaches to detect hazardous tree (Li et al. 2022). The majority of research on tree hazards has concentrated on the experts perspectives, paying little attention to general public point of views (Suchocka et al. 2019). The public's ability to recognise or evaluate dangerous trees in their environment is not well understood. Thus, further study is required in order to understand how the general public perceive dangerous tree. To assist in establishing a feasible risk mitigation strategy, this study focuses on comparing the hazard attributes that have been identified by the general public and experts. These results offer insightful information that can help tree managers make wise choices and put more successful urban tree risk management techniques into practice.

This article begins by providing context and introducing the topics of hazardous urban trees in tree risk management. The article then examines the current body of literature on hazardous urban tree and hazard tree identification in experts and general public views. The third section of the article presents detailed information on the materials and methods used in the study. In the fourth section of the article, the results of the quantitative analysis are analysed and presented. The article concludes with a summary of the findings and recommendations for future research on the topic.

LITERATURE REVIEW

Hazardous Urban Tree

Urban trees are essential for improving the quality of life in urban because they offer a variety of social, economic, and environmental advantages. They support environmental sustainability and climate resilience by managing stormwater runoff, lowering air pollution, and battling urban heat as components of green infrastructure. Besides that, urban trees can remove pollutants and sequester carbon, with one study estimating annual air pollution removal benefits worth up to US $14 billion in desert regions alone while reduce surface temperatures by 1.5 °C even in small scale settings like parks or street corridor (Isaifan et al. 2020; Pataki et al. 2021). According to Kathleen (2025), urban tree plays a significant role in reducing psychological distress. Additionally, urban trees on streets can improve neighborhood aesthetics, promote walkability, foster community interaction, and increase the value of real estate (Croeser et al. 2024). Urban trees give many benefits toward social, economic and environmental that can improve quality of life but they also can become disservices toward their benefits itself.

Urban trees also can give cons to human and environment such as overgrown or poorly maintained trees that can obstruct visibility for drivers and pedestrians that can increase the risk of accidents (Roman et al. 2021). Align with Baumeister et al. (2022), poor conditions, maintenance issues, obstructing views and storm hazards are common disservices that adversely affect visitor experiences. Furthermore, there are hazards to public safety and property when branches fall during storms (Roman et al. 2021). In some cases, large trees have caused fatalities and injuries when limbs or trunks fall that can cause personal damages, economic losses and infrastructural (Abbas et al. 2020; Cadaval et al. 2024). Research in Kajang, Malaysia found residents submitted numerous tree removal requests due to issues like overgrown branches, aggressive roots, and conflicts with utilities (Hamzah et al. 2017). All the research shown that urban tree not just give benefits but it also can give cons toward human and environment leading to negative impacts toward people and environment itself.

The tree roots itself have the potential to harm underground utilities, sidewalks and other infrastructure. This damage can include the roadside, urban hardscape or properties owners like shophouse. Besides that, urban trees also present variable risk to human safety and infrastructure based on tree species, size, age, health, and maintenance history (Jodas et al. 2024). Tree will grow and the risk for the tree has defect will increase and become hazard. Defects may include dead branches, cavities, root damage, cracks, and poor tree architecture (Alabama Cooperative Extension System, 2025). These can lead into incident base on Hasan et al. (2017) stated, a Malaysian report recounts multiple incidents of fallen or defective trees causing vehicle damage and infrastructure hazards. This shown that hazardous urban tree really can bring negative impact toward people and environment itself. Several strategies must be done in order to reduce all these damage that will bring negative impacts toward users and urban surrounding in present or in future if not taking the problem seriously.

Proactive and methodical approaches are required to effectively manage the risks associated with urban growing and climate change intensifying. Ezzdihar et al. (2022), provided a methodical risk inventory model that is suited for urban tropical settings. This framework, which was created with expert input, enables municipalities to keep an eye on the health of their trees, spot potential threats, and implement focused management measures to lower risks and stop deterioration. Nonetheless, effective mitigation of urban tree hazards requires not only expert input but also public opinions regarding hazardous trees.

Hazard Tree identifications: Experts and General Public Views

Recent studies have highlighted notable differences in how the public and experts perceive the risks associated with hazardous trees. According to He et al. (2024), hazardous urban tree can be considered by looking at some factors which are species characteristics, site conditions (root/soil environment, wind exposure), tree health (crown vigor, decay status), load factors (crown density, wind load) and tree defects (internal decay, cracks, cavities). A risk matrix scoring system also can be develop for urban tree safety management base on all the factors. These also support by other researcher that said a risk inventory model can be develop by emphasizing factors which are species vulnerability factors, target risk potential, site level parameters, tree health indicators and defective features. According to experts, determining whether a tree poses a risk should take into account a number of crucial elements while public mostly identify hazardous tree by their own judgement.

The public frequently makes decisions based on their own judgement and might not be fully aware of all the risks. Mentioned by Judice et al. (2021), people in the community tend to undervalue the risks associated with trees and instead emphasise their advantages, such as shade and aesthetic appeal. Besides that, Hamzah et al. (2020) mentioned, publics frequently labelled trees as dangerous, overgrown, obstructing or poorly maintained showing concern based on visible features and discomfort. This underscores how public perceptions of hazardous trees are primarily driven by what they can see and experience. Other than that, there were research found that pperceived safety and visual quality such as clean vegetation and clear sightlines are highly correlated (He et al. 2024; Wang et al. 2022). Typically, the public use the appearance of a tree as opposed to a more structured professional approach to determine dangerous trees.

Tree risk can be better managed by integrating the two viewpoints, guaranteeing public safety and upholding confidence. Stated by Judice et al. (2021), integrate expert knowledge with public perception need to emphasizes for make acceptable and effective risk decisions. Besides that, with combining expert and public perspective, they can find what is similar in prioritize and concern regarding urban tree (Wang et al. 2023). These support by Hassan et al. (2024), balance professional judgments and public expectations when removing trees in urban projects will be acceptable and trusted when engage both groups. Understanding the experts and the general public perspectives is crucial for managing tree risks makes tree related decisions safer, better and more reliable.

RESEARCH METHODOLOGY

Study Area

The Kajang Municipal Council (MPKj) in Malaysia is where this study was carried out. Due in large part to the Klang Valley regions rapid economic development, MPKj has experienced substantial urbanisation over the last 20 years. About 224.53 km^2 of built-up areas, including parks, open spaces, infrastructure, utilities, residential, commercial, industrial and transportation networks are under the councils jurisdiction (Hamzah et al., 2020). These places have scattered tree plantings in locations including housing scheme, buffer zones, road reserves, green spaces, gardens, and river reserves. The public has been complaining about dangerous trees to MPKJ more and more in recent years (Hamzah et al. 2017).

Data Collection and Analysis

380 people were selected from MPKj 2025 hazardous tree complaint records were sent a questionnaire via an online platform. 116 people completed the survey and the result were analysed using descriptive analysis in SPSS. According to Moncayo at al. (2025), the sample size is considered valid since it represents more than 30% of the target population. In order to reach the study's goal, the quantitative questionnaire, which had been designed using a 5-point Likert Scale, included hazardous tree assessment attributes: the tree species, target, site factor, tree health, loading factor and tree defect, that applied by experts (Li et al. 2022). Prior to being sent to a larger sample of respondents, the questionnaire performed a pilot study to evaluate its reliability.

RESULT AND DISCUSSION

The Pilot Test: Reliability Analysis

A pilot test was carrier out using an online platform (email and WhatsApp) with ten respondents chosen from MPKj's 2025 hazardous tree public complaint records. The Cronbach's alpha coefficient was computed using SPSS's reliability function which was used to evaluate the questionnaire's reliability. The resulting Cronbach's alpha value was 0.76, indicating an acceptable of reliability beyond the acceptable threshold of 0.70 (Ahmad et al. 2024). Table 1 presents the respondent's profile for the pilot test.

Table 1: *The respondent's profiles for pilot test.*

Attribute	Frequency	%
Year Of Birth		
Generation X (1960-1980)	3	30.0
Generation Z (>1995)	7	70.0
Gender		
Male	2	20.0
Female	8	30.0
Level Of Education		
Postgraduate (Degree and above)	6	60.0
Undergraduate (Diploma and below)	4	40.0
Employees		
Private sector	3	30.0
Public sector	1	10.0
Student	4	40.0
Not working	2	20.0

Note: N = 10

Source: Author

Respondent's Profile

The profile of the respondents contained information on their gender, age, education and work status. The demographic information of the 116 participants in the study is shown in Table 2. The gender distribution of them was 62.9% female and 37.1% male. 84.5% of those surveyed were members of Generation Z. The highest education with 55.2% of respondents was a bachelor's degree. 31.9% of those with employment status were students, 38.8% were in the private sector and 22.4% were employed by the government.

The findings indicate a high percentage of female respondents with a bachelor's degree education. This support by Cuadrado et al. (2024) and Cuesta et al. (2022) finding that people who are more educated and female are more likely to be concerned about tree related issues. Furthermore, Hamzah et al. (2025), found that employees in the private sector are more concerned about tree related issues, thus align with these study's findings.

Table 2: *The respondent's profiles participated in the study*

Attributes	Frequency	%
Year Of Birth		
Veteran Generation (<1946)	1	0.9
Generation X (1960-1980)	8	6.9
Generation Y (1980-1995)	9	7.8
Generation Z (>1995)	98	84.5
Gender		
Male	43	37.1
Female	73	62.9

Level Of Education		
Postgraduate (Degree and above)	68	58.7
Undergraduate (Diploma and below)	48	41.3
Employees		
Private sector	45	38.8
Public sector	26	22.4
Student	37	31.9
Not working	8	6.9

Note: N = 116

Source: Author

The Public Perspectives on Hazardous Trees

The results show that the public places greater emphasis on factors such as site factor, tree health, load factor and tree defects compared to tree species and tree target (Table 3). This aligns with the findings of Wan et al. (2022) and Wang et al. (2023) who noted that hazardous tree attributes are closely related to the condition and characteristics of the tree itself. Regarding specific hazardous tree factors identified by experts, site factor were perceived as moderate important by some respondent profiles, except for males, generation Z, undergraduates, private sector employees, and students. This finding highlights the need for more targeted insights to support the development of effective tree risk management strategies.

Base on respondent profile attributes, six attributes show the tree health is consider as highly factor for identify hazardous tree which are male, generation X, generation Y, individuals with postgraduate education, public sector employees and student (Table 4). This support Judice et al. (2021) and Salim et al. (2021) noted that tree condition such as decay or pest damage, are critical cues the public uses to recognise tree hazards. Furthermore, these align with Suchocka et al. (2022) who found visible decay, cavities or fungal growth significantly increase branch or trunk failure risks. It emphasizes that tree health assessments are foundational for informed risk management in urban landscapes. This finding shows that the understanding from both perspectives can help improve communication, risk awareness, and more effective tree management in urban areas.

The load factor, result show female, veteran generation, generation Y, generation Z, individuals with postgraduate education and private sector employees have determined highly important regarding this factor. The finding was support the study by Jeong et al. (2023) and Mat et al. (2025) that noted load factor can be use for identify hazardous tree from public perspective. This explains by Luo Yi (2022) that heavier crowns and taller structures become vulnerable under high wind, aligning with public concerns when trees appear top-heavy or sways. Better communication and safer urban tree management can be facilitated by acknowledging these common concerns from various angles.

The tree defect is highly important factor determined by most respondent profile except female, generation X, individuals with postgraduate education and student. Base on Hamzah et al. (2020) and Suchocka et al. (2023) that highlight structural flaws strongly drive public concern and pressure on authorities. This finding similar to Li et al. (2022) that noted the importance of advanced to detect internal defects such as cracks, decay, and wood embrittlement for links these defects directly to reduced load bearing strength and elevated hazard levels. Enhancing awareness and encouraging better management choices can be achieved by incorporating visual defect assessment into urban tree safety and public communication initiatives.

Apart from all the factor, there are some factors that has low important toward public perspective which area tree species and tree target. The result show only female, veteran generation, generation X, generation Y, individuals with postgraduate education, and student has highly importance for tree species factor. Similar to Law et al. (2023) said that public focusing more on observable safety traits rather than species identity. Moreover, Hasan et al. (2018), highlighted that the tree species is important for identify hazardous tree due to traits like weak wood or tree form. With this finding, urban tree risk management can be made more accessible by recognising species-level characteristics in addition to visible cues.

The result show tree target is one of the low factor that contribute to identify hazardous tree by public perspective. This shown at Table 4 with only male, generation X, generation Y, individuals with postgraduate education and private sector employees are the only respondent profile that have highly important in this factor. According on Buson Matteo (2025), the majority of affected trees were concentrated in roadside rows and associated group, raising significant safety concerns for both people and property. This show that tree target is one of the important factors for identify hazardous tree. Although public understanding of tree target as a risk factor is limited, this is typically due to lack of explicit framing or education. This gap must be closed in order to improve urban tree safety by clearly educating the public the value of taking into account what or whom the tree may affect, resulting in safer and better-informed communities.

Table 3: *Public relies on identifying and understanding hazardous trees.*

Expert Identifying Tree Hazardous's Factors	**Public Identifying Tree Hazardous's Factors**						
	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Identified *(Compare mean and weigthed average)*
Tree Species It is important to know the tree species in order to know if the tree is dangerous or not.	3 (2.6%)	4 (3.4%)	18 (15.5%)	65 (56%)	26 (22.4%)	3.92	Low
Tree Target The dangerous of the tree can measure by what the tree might hit when it falls.	3 (2.6%)	4 (3.4%)	12 (10.3%)	60 (51.7%)	37 (31.9%)	4.07	Low
Site Factor The site element (land, soil, wind) can affect how dangerous a tree might be.	2 (1.7%)	1 (0.9%)	14 (12.1%)	52 (44.8%)	47 (40.5%)	4.22	High
Tree Health Knowing the health of a tree helps us figure out if it could be dangerous.	2 (1.7%)	1 (0.9%)	10 (8.6%)	57 (49.1%)	46 (39.7%)	4.24	High
Load Factor The pressure on a tree such as heavy loads or strong winds can make it dangerous.	2 (1.7%)	3 (2.6%)	9 (7.8%)	45 (38.8%)	57 (49.1%)	4.31	High
Tree Defect Tree issues such as cracks or weak spots can make it dangerous.	2 (1.7%)	0 (0%)	16 (13.8%)	51 (44%)	47 (40.5%)	4.22	High

Note: Weighted Average = 4.16

- *Weighted Average (WA) = (wi×xi) / wi*
- *xi = numerical value assigned to the likert option*
- *wi = weight or frequency*

Source: Author

Table 4: *The public perspectives on identifying hazardous trees.*

Hazardous Tree Factors (Experts View)	Public Perceive Toward Hazardous Tree										
	Gender		Age Generation				Education		Employees		
	Male	Female	Veteran Generation (<1946)	Generation X (1960-1980)	Generation Y (1980-1995)	Generation Z (>1995)	Postgraduate (Degree and above)	Undergraduate (Diploma and below)	Private Sector	Government Sector	Others (student)
Tree Species $\bar{x}$ = (3.92)	Low (3.81)	High (3.99)	High (4.00)	High (4.13)	High (4.22)	Low (3.88)	High (3.99)	Low (3.83)	Low (3.89)	Low (3.62)	High (4.08)
Target $\bar{x}$ = (4.07)	High (4.12)	Low (4.04)	Low (4.00)	High (4.38)	High (4.56)	Low (4.00)	High (4.09)	Low (4.04)	High (4.16)	Low (4.00)	Low (3.95)
Site factor $\bar{x}$ = (4.22)	Low (4.19)	High (4.23)	High (5.00)	High (4.38)	High (4.44)	Low (4.17)	High (4.24)	Low (4.19)	Low (4.16)	High (4.27)	Low (4.16)
Tree health $\bar{x}$ = (4.24)	High (4.28)	Low (4.22)	Low (4.00)	High (4.25)	High (4.33)	Low (4.23)	High (4.32)	Low (4.13)	Low (4.20)	High (4.27)	High (4.27)
Load factor $\bar{x}$ = (4.31)	Low (4.26)	High (4.34)	High (5.00)	Low (4.13)	High (4.44)	High (4.31)	High (4.35)	Low (4.25)	High (4.40)	Low (4.23)	Low (4.24)
Tree Defect $\bar{x}$ = (4.22)	High (4.28)	Low (4.12)	High (5.00)	Low (4.00)	High (4.22)	High (4.22)	High (4.26)	Low (4.15)	High (4.29)	High (4.35)	Low (4.05)

Note: N = 116; $\bar{x}$ = Mean Value; Weighted Average = 4.16

- *The result analysed by applying mean in frequencies at descriptive statistic using SPSS software from respondenst data.*

Source: Author

CONCLUSION

This study found substantial differences between the public's and the views of experts of hazardous tree factors (Figure 1). Only four of the six important factors; tree species, tree target, site factor, tree health, load factor, and tree defect were recognised by the general public, although professionals recognised six. Notably, the public did not recognise tree species or tree targets, indicating an important information gap that may cause some problems associated with trees to be underestimated. The findings provide tree managers significant guidance to formulate structured efficient tree risk management strategies. To fill this knowledge gap and prevent possible exposure to hazardous trees, more focus should be put on including tree species and tree target considerations in public outreach and educational initiatives. The study has limitations by concentrating on a specific locality, which could limit how broadly the results can be applied. A more thorough grasp of the perspectives of the publics about the recognition of tree hazards should be achieved by expanding future study to cover more regions or locales.

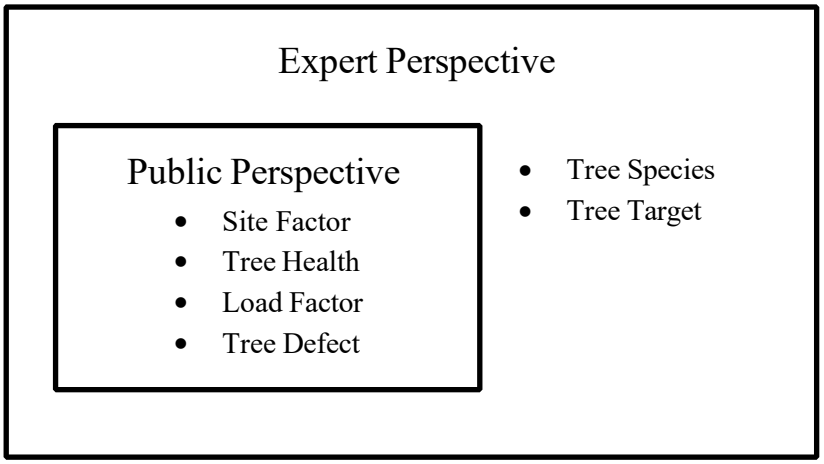

Figure 1: *Comparison of expert and public perspectives recognised hazardous trees factors.*

Source: Author

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