PERCEIVED FLOOD RISK AND INSURANCE STATUS AMONG PAHANG RESIDENTS: A COMPARATIVE STUDY

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ABSTRACT

Flooding has been a regular concern in Pahang, Malaysia, causing significant property damage and disrupting lives. Relying largely on the government to provide financial help in the event of floods may not be a sustainable approach, given the government's current financial strain. It is crucial for Pahang residents to proactively uptake flood insurance to ensure their resilience in the face of flood-related disasters. Understanding residents' perceptions of flood risk and their insurance status is crucial for effective disaster management and the development of mitigation strategies. The study intends to investigate the differences in perceived flood risk levels among residents with different insurance statuses. The study employed a quantitative approach,

involving a sample of 116 respondents residing in Pahang. The results of the independent t-test reveal significant differences in perceived flood risk (perceived susceptibility and perceived severity of floods) between insured individuals and uninsured individuals. This study will make a valuable contribution to the existing body of knowledge on flood risk and flood insurance within the Malaysian context, with a specific focus on the state of Pahang. The results will contribute to the development of targeted interventions, public awareness campaigns, and policy recommendations aimed at improving flood resilience and encouraging greater insurance uptake among Pahang residents.

Keywords: Climate change, flood insurance, perceived risk, perceived severity, perceived susceptibility

INTRODUCTION

Climate change and rapid urbanisation are expected to have increasingly devastating effects on future floods (Jongman et al., 2014; Winsemius et al., 2016). Floods are a widespread occurrence, affecting both developed countries and developing nations like Malaysia. Despite their annual recurrence, the detrimental impacts of floods persist unabated. The volatile nature of climate change further complicates the accurate prediction of flood incidents, making it challenging for humans to anticipate their timing and locations. While it is undeniable that floods cannot be entirely averted, their adverse consequences can be mitigated through the implementation of appropriate measures such as flood mitigation and preparedness. Roder et al. (2019) contended that there is a strong need to limit flood impacts. Past researchers (e.g. von Peter et al., 2012; Abbas et al., 2015) argued that flood insurance is one of the best instruments to mitigate the impact of flood. The successful use of insurance provides a rapid and useful alternative to aid recovery in order to reduce potential long-run impacts, compared to ad-hoc government compensation.

Nonetheless, some individuals lack the inclination to purchase flood insurance as they believe that governmental assistance will be available in the event of a flood. Aliagha et al. (2015) highlighted that flood insurance has been a neglected aspect of comprehensive flood risk management in Malaysia. Zampetti et al. (2012) contended that this has resulted in large government expenditures for financial aid, but it is still insufficient to fully compensate for the reported flood damage. While ex-post support can assist the recovery process for those affected by a flood, it also translates into people's lack of adoption of protective measures or insurance. This phenomenon is called charity hazard (Raschky et al., 2013), in which altruism could play a negative role in people's flood risk management behaviour (Buchanan, 1975) and the development of natural hazard insurance markets. Governments have historically been in charge of flood management, and their solutions have often involved costly structural restrictions (like dykes) designed to keep water away from people and their belongings. However, in light of mounting flood losses, this strategy has come under heavy scrutiny and the ideas of integrated flood risk management (FRM) are beginning to gain traction (Sayers et al., 2013). Flood risk management entails a strategic approach aimed at diminishing the impacts of flooding through the distribution of responsibility among various stakeholders. It involves the coordination and execution of diverse strategies intended to minimise risks across different scales and sectors (Klijn et al., 2008).

Flood insurance plays an important role in climate adaptation by recovering insured losses in the event of catastrophic flooding (Lo, 2013). For individuals to employ property-level flood risk management strategies, they must have a sufficient level of knowledge to understand the threat they face (Roder et al., 2019). Nevertheless, some individuals are reluctant to obtain flood insurance due to a lack of comprehension regarding the actual risks posed by flooding. Several research has shown adverse effects of catastrophic events on householders' expenditure and income (Thomas et al., 2010; Mottaleb et al., 2013), as well as on livelihood (Sarkar et al., 2019; Huong et al., 2019), which necessitates the need for homeowners to embrace insurance as a way to manage and transfer risk.

Therefore, a positive outlook towards insurance supports homeowners in the restoration of their assets whenever peril befalls. Surprisingly, despite acknowledging the pivotal role of home insurance in mitigating losses, its subscription remains minuscule in Pahang, Malaysia. In the absence of a national catastrophe insurance mechanism, a vast proportion of homeowners have to rely on out-of-pocket payments to cover catastrophic reconstruction costs (Mathur & Paul, 2022).

Recent decades have witnessed an increasing risk of hydrometeorological hazards like floods, extreme rainfall and tropical storm worldwide. Although floods are the most common and devastating natural calamity in Malaysia, citizens are not prepared well to deal with them. In the East Coast Region, Pahang was the hardest hit by the flood, with a total of 94,865 victims and 21 fatalities, according to the *Jawatankuasa Pengurusan Bencana Negeri* (2021)'s Report on Disaster Incidents Across the Country for the Year 2021. The north-eastern coast of Pahang will experience not only a 10 to 18% increase in average monthly rainfall or a maximum monthly of over 51% between 2025 and 2050, but also accelerated average monthly flows in the range of 5 to 12% over its watersheds (Aliagha et al., 2015).

Insurance is a form of risk transfer that enhances the individual's capability to recover from a disaster (Cardona et al., 2012). Although risk transfer can be a cost-effective way to manage risks, including floods (Cummins & Mahul, 2009), it is still unclear how insurance can influence risk levels (Surminski & Oramas-Dorta, 2014). Studying the relationship between perceived flood risk and insurance status allows an evaluation of the extent to which residents' perception are aligned with their insurance decisions. Aliagha et al. (2015) argued that flood insurance is only under research in Malaysia and across Southeast Asia, where collateral damages to properties from floods are common.

Therefore, this study attempts to examine the significant difference in the flood perceived risks between insured and uninsured individuals in Pahang, Malaysia. Identifying any

discrepancies or gaps between perceived risk and actual coverage can provide valuable information for policymakers and insurance companies to bridge the gap and enhance the effectiveness of insurance programs. Hence, researching floods in Pahang can lead to a better understanding of the region's flood risk profile, support evidence-based decision making, and contribute to the development of comprehensive flood management strategies that enhance resilience and minimise the adverse impacts of floods.

LITERATURE REVIEW

Perceived risk refers to the combined measurement of perceived susceptibility (probability) and perceived severity (consequences) of a certain event or activity (Bubeck et al., 2012). Perceived susceptibility refers to perceptions of how easily an individual can be influenced by a risk factor (Kim & Madison, 2020), while perceived severity indicates how severely an individual perceives a risk factor (Kim & Madison, 2020). Insurance is a key factor in reducing the risk for individuals, enterprises and society where natural hazards are a concern. Proper insurance can mitigate the effects that extreme events have on them and can prevent them from being ruined. Being insured makes people believe to be less vulnerable and less concerned, and even welcome destructive events (Kron, 2002). Although flood insurance cannot prevent actual property damages or loss of life as structural measures would do, it can significantly reduce the economic risk associated with flooding. An insured property damaged by the flood can be replaced quickly without much financial stress to the government. A community with extensive flood insurance can rebuild faster after a flood (Aliagha et al., 2015).

Insurance spreads the economic costs of such events across many policyholders. In this way, the potentially catastrophic consequences for individual households and businesses are shifted to insurance companies (Botzen et al., 2008). Homeowners who are well-conversant with the home insurance plan exemptions and coverages may perceive lesser vulnerability towards disaster losses. The form of knowledge the homeowner possesses will also

influence their perception of vulnerability to disaster loss. Mathur and Paul (2022) found that homeowners who bought flood insurance may perceive themselves to be less vulnerable to disaster loss. This is because if homeowners understand the fundamentals of home insurance (e.g. policy sponsor/ policyholder, policy premium, coverage, replacement cost/reinstatement value, market value, agreed value, sub-limits, deductible, deductions, burglary/larceny/theft, etc.), they will have a reduced sense of vulnerability. After all, they may believe that owning it will assist them in managing uncertain but possible future outcomes.

Insured individuals are more likely to perceive themselves as being protected against potential flood-related losses because they have taken proactive measures by obtaining flood insurance. They may feel more secure in the knowledge that they have financial coverage in the event of a flood. On the other hand, uninsured individuals may have a higher perceived susceptibility to flood-related risks. They do not have the same level of protection and may feel more vulnerable to potential losses associated with flooding. Their perception of susceptibility may be influenced by factors such as their location in flood-prone areas, previous experiences with flooding or knowledge about the likelihood of floods occurring in their region.

In terms of perceived severity, Cai and Song (2017) contended that it is more common for uninsured individuals to have better knowledge about fire prevention than insured individuals. This is because people with insurance are less likely to take measures to reduce the damage. After all, they have insurance to depend on. Insurances are a form of risk transfer that enhances the individual's capability to recover from a disaster; thus, reducing the person's perceived severity and vulnerability (Cardona et al., 2012). Hence, it is believed that uninsured individuals may have a heightened perception of susceptibility and severity than insured individuals, due to their vulnerability and lack of financial protection.

H1: There is a significant difference in perceived susceptibility to flood between insured individuals and uninsured individuals.
H2: There is a significant difference in perceived severity of flood between insured individuals and uninsured individuals.

METHODOLOGY

The study employed a quantitative approach, involving a sample of 116 respondents residing in Pahang who completed the questionnaires. Data analysis was undertaken using SPSS (version 26) Software. Before analysing a hypothesis, the reliability and normality tests were carried out to examine the normality and reliability of the data. Internal consistency reliability testing was carried out for all the scales. Reliability testing measures the consistency of the questionnaire to determine if the items on the scale measured the same construct. Mohammad-Pajooh (2014) suggested that the overall internal reliability is good when Cronbach's alpha is greater than 0.60. George and Mallery (2003) provided the following rules of thumb: > 0.9 – Excellent, > 0.8 – Good, > 0.7 – Acceptable, > 0.6 – Questionable, > 0.5 – Poor and < 0.5 – Unacceptable.

Table 13. 1: Reliability test results

Variables	Cronbach alpha	No. of items
Perceived flood risks:		
Perceived susceptibility	.962	5
Perceived severity	.923	5

Besides that, a normality test was also carried out to ensure the research data are normal, and then can proceed with t-test analysis. Table 13.1 depicts that both perceived susceptibility and perceived severity variables were reliable and acceptable since the Cronbach Alpha values were more than .60. Besides that, Table 13.2 depicts that the data of the study were normal since the values of skewness and kurtosis were within the range between -2 and +2.

Table 13. 2: Normality test results

Variables	Skewness	Kurtosis
Perceived flood risks		
Perceived susceptibility	-.490	-1.034
Perceived severity	-.533	-.813

There are two types of statistical inference, which are parametric and nonparametric methods. Parametric methods refer to a statistical technique in which one defines the probability distribution of probability variables and makes inferences about the parameters of the distribution. In cases where the probability distribution cannot be defined, nonparametric methods are employed. T-tests are a type of parametric method. They can be used when the samples satisfy the condition of normality. There are three types of t-tests, which are one sample t-test, independent samples t-test and paired samples t-test. This study utilised the independent t-test.

The independent t-test, also called the unpaired t-test, is an inferential statistical test that determines whether there is a statistically significant difference between the means in two unrelated (independent) groups. T-tests are usually used in cases where the experimental subjects are divided into two independent groups, with one group treated with A and the other group treated with B (Kim, 2015). Hence, the t-test analysis under parametric analysis was utilised to ascertain the research objectives.

RESULT

Table 3 reveals the demographic profile of the respondents. In terms of gender, the data shows that out of the total respondents, 44 individuals (38.6%) are identified as male, while 70 individuals (61.4%) identified as female. Examining the ethnic composition of the respondents, the majority of the sample (64.0%) are identified as Malay, with a frequency of 73 individuals. The

Chinese ethnic group accounted for 21.1% of the respondents, with 24 individuals, while the Indian ethnic group constituted 14.9% of the sample, with 17 individuals. This breakdown demonstrates the ethnic diversity within the population under study, reflecting the multi-ethnic nature of Pahang. Regarding the types of communities in which the respondents reside, the data reveal that 25.4% (29 individuals) are from rural areas, 27.2% (31 individuals) from suburban areas and 47.4% (54 individuals) from urban areas. This distribution sheds light on the geographical distribution of the population, and enables a comparison of experiences and perceptions across different community settings.

The occupation variable provides insights into the employment status of the respondents. Among the respondents, 8.8% (10 individuals) are identified as housewives, while 3.5% (4 individuals) are engaged in non-governmental organisations (NGOs). Private sector workers accounted for 21.9% (25 individuals) of the respondents and public sector workers comprised 14.0% (16 individuals). School students represented 14.9% (17 individuals) and self-employed individuals accounted for 9.6% (11 individuals). Besides that, 4.4% (5 individuals) are unemployed, while university/college students represented 22.8% (26 individuals). This breakdown highlights the diverse occupational backgrounds of the respondents, allowing for the examination of perspectives and experiences across different employment sectors.

Table 13. 3: Demographic profile of the respondents

Variable	Items	Frequency	Percentage
Gender	Male	44	38.6
	Female	70	61.4
Ethnicity	Malay	73	64.0
	Chinese	24	21.1
	Indian	17	14.9
Types of community	Rural	29	25.4
	Suburban	31	27.2
	Urban	54	47.4
Occupation	Housewives	10	8.8

Variable	Items	Frequency	Percentage
	Non-Governmental Organizations (NGOs)	4	3.5
	Private Sector Workers	25	21.9
	Public sector worker	16	14.0
	School Students	17	14.9
	Self-employed	11	9.6
	Unemployed	5	4.4
	University / Colleges Students	26	22.8

To test the research hypothesis, independent samples t-test analysis was conducted to compare insurance status differences in perceived susceptibility to flood among Pahang residents. Results in Table 13.4 show that there was a significant difference for flood insurance status, $t(114) = 3.292$, $p < .05$, with uninsured individuals (M=3.93) having higher scores of perceived susceptibility than insured individuals (M=3.16). Hence, H1 was supported. In addition, the results of the study also found that there was a significant difference in flood insurance status, $t(114) = 2.470$, $p < .05$, with uninsured individuals (M=3.89) having higher scores of perceived severity than insured individuals (M= 3.34). Therefore, H2 was supported.

Table 13. 4: T-test results of the study

Hypothesis	Constructs	Flood Insurance Status				df	t	Sig. (2-tailed)
		Insured individual (n=50)		Uninsured individual (n=66)				
		M	SD	M	SD			
Hypothesis 1	Perceived Susceptibility	3.16	1.23	3.93	1.26	114	3.292	0.001
Hypothesis 2	Perceived Severity	3.34	1.11	3.89	1.23	114	2.470	0.015

DISCUSSION

In conclusion, the findings of the study prove that those flood-insured individuals perceived less severity and susceptibility of a flood than the uninsured individuals. This situation happened because the insured individual transferred part or all losses resulting from the flood to an insurance company that is believed can effectively absorb the risks (Kunreuther & Roth, 1998). Individuals take fewer risk-reducing measures after purchasing insurance (Botzen et al., 2019). Onafalujo et al. (2011) contended that insurance manages risks so that insured individuals could have confidence in taking risk or reducing risk aversion. Blanchard-Boehm et al. (2001) found that those who have purchased flood insurance felt that flood insurance can cover the cost of damages. Insurances are a form of risk transfer that enhances the individual's capability to recover from a disaster; thus, reducing the person's perceived severity and vulnerability (Cardona et al., 2012). Surminski and Oramas-Dorta (2014) ntended that flood insurance may contribute to moral hazard as it may lead to complacency of individuals at risk.

Insured individuals have taken proactive measures by obtaining flood insurance, which provides them with financial protection in the event of a flood. They know that their insurance policy will help cover the costs associated with property damage, repairs or replacements. This financial safety net can contribute to a reduced perception of severity because they believe they have the means to recover from the losses. By purchasing flood insurance, individuals transfer a portion of the financial risk associated with flooding to the insurance company. This transfer of risk can alleviate concerns about the severity of the potential impact, because they have shifted a significant portion of the financial burden to the insurer. Besides that, having flood insurance can provide individuals with a sense of security and peace of mind. They know that they have taken steps to protect themselves against potential losses, which can reduce their perceived severity of floods. The knowledge that they have coverage and support in place may help them feel more prepared and less overwhelmed by the potential consequences of flooding.

CONCLUSION

Natural hazards and disasters are often uncertain, unpredictable and uncontrollable. Therefore, the public must maintain a sufficient level of risk perception. Typically, individuals who perceive a higher level of risk tend to exercise greater caution and prepare in anticipation of flood events. The findings of the study found that uninsured individuals have higher scores of perceived susceptibility and severity than insured individuals. Individuals who have flood insurance may feel a sense of protection or security, which could potentially lead to a lower perception of susceptibility and severity. Having flood insurance means that individuals have taken proactive steps to mitigate the financial risks associated with flooding. They have coverage that can help them recover and rebuild in the event of flood damage. This sense of financial protection may influence their perception of susceptibility to flooding, as they believe they have a safety net in place.

If individuals underestimate the likelihood and severity of flooding, they may be less likely to take necessary precautions and invest in flood-resistant measures. This lack of preparedness can leave them vulnerable to significant damage and loss in the event of a flood. Besides that, lower perceived susceptibility and severity can lead to complacency and a lack of proactive measures to mitigate flood risks. For example, individuals may neglect to elevate their homes, install flood barriers or implement proper drainage systems. This lack of investment in mitigation measures can increase the potential of property damage and harm individuals during flood events. During an impending flood, individuals with a reduced perception of susceptibility and severity may be less likely to evacuate promptly. They may underestimate the speed and intensity of floodwaters, and delay taking necessary evacuation measures. This delay can put their lives at risk and make rescue operations more challenging. Floods can cause significant emotional distress and trauma, both during and after the event. If individuals have a diminished perception of the severity of floods, they may be ill-prepared to cope with the emotional toll caused by the destruction of property, displacement and potential loss of loved ones. This can lead to prolonged psychological distress and hinder

the recovery process.

Hence, it is important to promote an accurate and comprehensive understanding of flood risks, regardless of whether individuals have flood insurance. Educating communities about the potential impacts of flooding and encouraging proactive measures can help mitigate the negative consequences associated with reduced perceived susceptibility and severity. This study, like any other, has limitations that indicate potential areas for future research. Because the respondent selection procedure and non-probability sampling measures did not produce a statistically representative sample, this study is unable to generalise interpretation of the entire population. It is suggested that future research can embark on a probability sampling technique, so that the findings are generalisd to all Pahang residents.

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