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Flooding: The Mental, Social and Health Effects of Flood Disasters

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Abstract

The major flood that hit most of the states in Malaysia towards the end of 2021 had posed devastating effects on its victims. Among them are Universiti Teknologi MARA (UiTM) students around the country, particularly those from UiTM Negeri Sembilan branch. The purpose of this study is to examine the mental, social and health effects experienced by the students due to the flood. This quantitative study used an online survey distributed to 46 students who were directly affected by the disaster. Data analysis was conducted using the Statistical Package for Social Sciences (SPSS). The results provide insight to the mental, social and health effects experienced by the students due to the flood. Most of the students were found to be affected mentally, harbouring anxiety that the flood would happen again. Physical exhaustion from having to clean and repair their homes was also highly noticeable. Although the victims expressed feelings of shock, unpleasantness, and worry following the devastating experience, they also felt that life must go on. They demonstrated the need for strong social support from the relevant parties to manage and prevent the effects of other natural disasters. To gain better country-wide comparisons, future research could use a larger sample of flood victims and engage those of different ages and family roles.

Keywords: Flood, Students, Mental, Social, Health

Introduction

Flooding is the state where a large area is completely submerged in water. Studying rainfall and water flow patterns could help predict the occurrence of floods. However, floods can occasionally happen very quickly due to typhoons or levee leaks, commonly known as flash floods. In Malaysia, floods pose the biggest and gravest threat out of all natural disasters. In Peninsular Malaysia for an example, the east coast zone which includes the states of Kelantan, Terengganu and Pahang receive higher rainfall distribution than states in the west coast and other zones. Nevertheless, an unprecedented event occurred in 2021 when several non-flood-prone states and localities in Malaysia succumbed to the major catastrophe.

The floods destroyed more than just properties. According to {Formatting Citation}, the event also caused psychological effects on the victims. In the process of moving to the flood evacuation centers, the victims who were already traumatized by the loss of their property and loved ones once again had to face issues such as discomfort, inadequate food and equipment supply, human conflicts, and overcrowding (Berita, 2021). They also experience long-term effects such post-traumatic stress disorder (PTSD), hopelessness, and anxiety, all of which would affect their emotions. Although the victims must carry on with their daily activities, they still need some time to recover from all the loss (Husna, 2021). At the same time, the flood victims also develop health issues. When it comes to mental health, disaster victims would experience the post-consequences up to nine months, and if left untreated, it could result in mental health issues (My Metro, 2022).

The disastrous floods in Malaysia which occurred at the end of 2021 had resulted in nationwide sorrow and shock due to the loss of many lives. This "*little tsunami*" had impacted many including a significant number of college and university students who lost their family members, personal belongings, and course materials (Farrah & Sharfizie, 2022). It was reported that the catastrophic floods had affected 7,264 students of higher learning institutions (Rohaniza, 2022). Undoubtedly, the students need assistance in order to recover and continue with their lives, including proper psychosocial interventions (Yusoff & Aziz, 2021). This is important because the recovery process could restore everything to "normal" and "stable" conditions so that the flood victims can resume their daily lives. Hence, this study aims to examine the mental, social and health effects of flood disasters on students. Specifically, this study was conducted among the students of UiTM Negeri Sembilan who were among the victims of the infamous 2021 floods. The information gathered from this study is useful for understanding the students' needs following the traumatic event.

Literature Review

Flooding is now the most frequent major disaster occurring in most parts of the world. In Malaysia, it is estimated that 9% of the total land or roughly about 29,800 km2 is considered to be flood-prone areas. Floods normally occur during the monsoon season due to continuous heavy downpour, especially in states located at the Eastern Peninsular of Malaysia. Nevertheless, other states are not spared from being affected by flooding. Historically, the countless occurrences of flash floods in most urban areas have reached a worrisome level. Areas such as Kuala Lumpur, Shah Alam, Penang and Ipoh have experienced massive flash floods incidents that caused a huge number of casualties and property damages.

The major flash flood that occurred in Malaysia in December 2021 took the lives of 50 people (Harian, 2021), which is the highest number of casualties caused by flooding in our national history. Victims from the affected areas were forced to move to temporary rescue centres, and a significant number of families lost their homes for good. In addition, thousands of cars were also found stranded after being immersed in the flood water, resulting in either major damages or total loss.

Such natural disaster poses various adverse impacts to those affected including loss of life, property damage, loss of crops and livestock, and deteriorating health condition due to waterborne infections. Some economic operations may halt, individuals may be required to leave their homes, and normal life routine would be disturbed due to damages to

communication lines and infrastructure such as power plants, highways, and bridges. Moreover, flooding can pose substantial mental, social and health problems that may continue over an extended period of time.

Mental Effects

In addition to general health effects, this study also looks at mental health effects caused by the flood. A significant number of literatures have highlighted this point. Numerous studies conducted in the United Kingdom have shown that the most significant effect of a flood event relates to mental health. Those studies highlight that flood events are associated with psychological morbidity including depression, anxiety and post-traumatic stress disorder.

Fothergill et al (2021) explored the psychological impacts of living with the uncertainty of persistent flood risks and how this affects psychological well-being, as well as examined the forms of support deemed appropriate to mitigate psychological risks. It was found that persistent flood risk is considered as a significant stress factor, regardless of previous flood experiences. Some respondents reported anxiety even just in anticipation of a future flood event and demonstrated low self-efficacy, with subsequent feelings of helplessness in responding to flood risk. In addition, individuals who did not assume the flood risk displayed higher anxiety and lower resilience.

Senarath (2011) discovered that a significant number of children who have been exposed to natural disasters experience short- and long-term psychological distress, anxiety and somatic issues following the disaster. Randeniya (2018) investigated the effect of flood disaster on adolescents in Sri Lanka in terms of physical, educational, economic, interpersonal relations, and mental aspects. The study showed that 88% of the adolescents experience bad feelings during continuous and heavy rain. They worry that they may have to face another bad episode. This led to the identification of post-traumatic syndrome disease (PTSD) among the respondents.

Social Effects

The second aspect investigated in this study is the social effects of flood on the victims. In the study by Randeniya (2018), most of the female respondents highlighted privacy issues especially with regards to having a proper place to change their clothes while holed up at evacuation centres. Despite that, a majority of the respondents mentioned that they received good support from their friends in many ways. The same study revealed that school teachers, religious centres, media and other volunteers had helped the victims to overcome challenges during the difficult period.

Nonetheless, the most significant social impact on the victims is the need to relocate during and after the flood. During the flood, most victims are rescued from their homes and brought to temporary shelters provided by the government or local authorities. Some may go to their relatives or close friends' house, while some would settle down at the shelter. Most of the times, in both cases, the situation may be uncomfortable for the victims. Issues of privacy, crowding, and insufficient basic facilities may pose a social threat to them.

Their normal routine would also be affected as they would be absent from work until the flood receded (Yusoff & Kadir, 2017). Ultimately, some of the victims may return to their homes, whilst others may not as their homes had been totally damaged by the flood. Even if they can salvage their house, in most cases, their personal belongings may not.

Thus, the most prominent sociological effect from any disaster is the matter of relocation, either to a totally new home or the need to rebuild the old one. Based on his study on the victims of the Katrina Hurricane in the US, Quarantelli (2005) found that disaster victims go through four stages of rehoming namely: 1) the temporary rescue center which is the immediate place after being saved from the disaster, 2) the rescue center where they would stay overnight, with food supply and basic necessities provided, 3) the location where the victims will build or rebuild their home, either at the original location or a new location, and 4) the permanent home where they would have to settle down regardless of their preference. These different stages are time consuming and may seem dreadful to the victims. In addition, the victims' normal routine would be disrupted. The tremendous changes and the fact that they would probably have to live with none of their previous personal belongings would be heart-breaking for them.

Health Effects

According to the WHO in its Floods and Health Fact Sheets for Health Professionals (2014), health effects occur directly through contact with flood waters or indirectly from damage to infrastructure, ecosystems, food and water supplies or social support systems. These effects can appear immediately or in days, weeks or months after the floods have receded. Two thirds of flood-related deaths worldwide are from drowning and one third from physical trauma, heart attacks, electrocution, carbon monoxide poisoning, or fire.

A study conducted in Nigeria discovered that 47.1% of the study respondents who were affected by flood suffer from diarrhoea outbreak (Olanrewaju et al., 2019). This is mainly due to contaminated drinking water from destroyed sanitary infrastructure and sewer systems.
The above finding is also supported by another study conducted in Pakistan which concluded that flooding not only increases the incidence of diarrhoea and fever, but also dietary diversity and meal frequency after the flood season is over (Sajid & Bevis, 2021). In this study, the authors focus on the link between flood and the health of children under the age of 5 by looking at the sanitary conditions they live in, whether good or poor.

Bich et al (2011) conducted a study in Hanoi, Vietnam to ascertain the vulnerability and health impacts of the devastating flood that occurred there. The study identified the differences in mortality, injuries, and morbidity patterns (dengue, pink eye, dermatitis, psychological problems, and hypertension) between flood affected and non-affected households. The respondents of the study entailed those who lived in Hanoi and had witnessed heavy rainfalls and flooding that occurred in the capital city. The result of this study supports the previously discussed results which concluded that flood events compromise access to crucial health services due to poor infrastructure and limited economic resources. The results also showed that falls and drowning are the major causes of injuries during flood events. Also highlighted are high cases of pink eye and dermatitis affecting the population.

Material and Methods

The sample population entails students from the Faculty of Business and Management UiTM Negeri Sembilan, Rembau campus including two programmes namely Diploma in Business Studies (BA111) and Diploma in Banking Studies (BA119). The total response rate was 100%, namely all the 46 respondents selected. This study was conducted from January 2022 until March 2022. A self-developed questionnaire was given to the students to acquire the necessary information. In this study, primary data was obtained by conducting a closed-ended online questionnaire to ensure that the accuracy and consistency of the data were aligned with the study objectives. The measurement scale used was the five-point Likert scale on a continuum from strongly disagree (1) to strongly agree (5) to measure either positive or negative responses to a particular statement. This study applied a non-probability sampling technique known as convenience sampling due to the fact as it is quick, easy, and inexpensive. The money and time invested in other probability sampling methods are quite large compared to convenience sampling. The researchers have easy access to the necessary components, making it simpler to gather participants for the sample. The data obtained were quantitatively analysed using the SPSS software. The method of analysis included descriptive analysis and comparison of means to attain the objectives of this study.

Results and Discussion

Reliability Analysis

Reliability entails the extent to which a measurement of a phenomenon provides stable and consistent results (Carmines & Zeller, 1979). Reliability can also be considered as repeatability. Moser and Kalton (1989) argued that the scale or test is considered dependable if it consistently produces the same result when repeated measurements are conducted using it. To assess the students' level of comprehension while responding to the online survey, the reliability test was crucial. Additionally, reliability serves as a tool to assess if the respondents (students) comprehend the requirements of the questions and if they were able to grasp and answer the questions. The reliability analysis was carried out by measuring the Cronbach's alpha to estimate the internal consistency of the online questionnaire. Table 1 summarises the Cronbach's alpha results for all the items under the variables.

Table 1
Cronbach's Alpha

Variable	Numbers of items	Cronbach's Alpha A
All	14	0.889
Mental	5	0.903
Health	4	0.675
Social	5	0.609

Demographic Profile

The percentage of male and female students in this study is (n=46). The students were predominantly female, accounting for 82.6%. Meanwhile, the male students accounted for 17.4%. Age wise, most of the students were between 19 and 20 years old (54.4%) with a mean of 20.54%. The state of Selangor accounted for the highest number of students involved in the flood with 84.8% followed by Negeri Sembilan (5%) and Kuala Lumpur and other states (1%).

Table 2
The Distribution of students according to the flood area (state)

Flood Area (State)	Frequency	Percent
Selangor	39	84.8
Negeri Sembilan	5	10.9
Kuala Lumpur	1	2.2
Others	1	2.2

Descriptive Analysis
Table 3
The responses obtained attributed to the level of mental effects of the flood on the students

Level of Mental Effects on the Students	Mean	Sd
My family and I are depressed because of the flood calamity.	2.8043	1.16656
My family and I frequently feel threatened because of the flood calamity.	3.1087	1.21524
I, along with the rest of my family, are saddened by the flood disaster and the fate that befell us.	3.0870	1.26185
As a result of the flood calamity, my family and I frequently feel furious at the prospect of further misfortunes.	4.1087	1.15909
I, along with my family, frequently experience fear when it rains in the neighbourhood because of the flood tragedy.	4.0000	1.21106

In terms of social effects, Figure 1 shows that 30.4% of the students had to request for emergency or calamity leave because of the flood. At the same time, the respondents also expressed neutrality (34.8%) towards the issue of daily routine disruption brought on by the flood. Some of the respondents indicated that they strongly disagreed with the statement of moving their family to a temporary evacuation centre (39.1%). Next, the respondents and their families were compelled to stay in an uncomfortable evacuation centre that was crowded and had little privacy (45.7%). The respondents also indicated that they strongly disagreed that the flood negatively affected them by causing them to lose their jobs and other sources of income (50%).

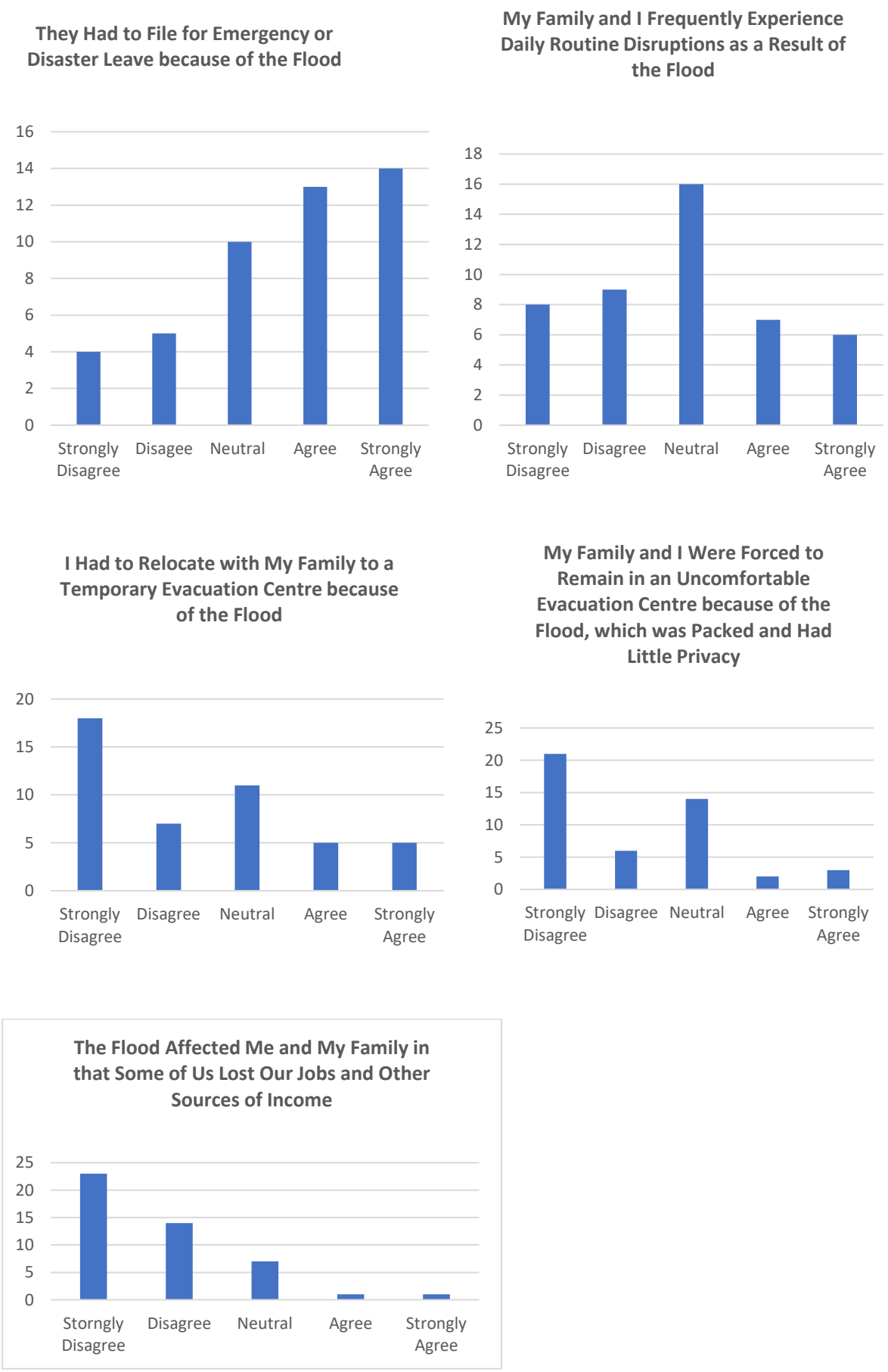

Figure 1: The responses obtained attributed to the level of social effects on the students

Additionally, the descriptive study evaluated the degree to which the flood had caused health effects on the students (Table 4).

Table 4
Frequency distribution on how the flood had affected the students' health

How the Flood had Affected the Students' Health	**Scale**	**Frequency**	**Percent (%)**
The flood had left me and my family members depressed	Strongly Disagree	14	30.4
	Disagree	6	13.0
	Neutral	19	41.3
	Agree	6	13.0
	Strongly Agree	1	2.2
The aftermath of the flood left me and my family exhausted from maintaining and cleaning our home	Strongly Disagree	2	4.3
	Disagree	3	6.5
	Neutral	4	8.7
	Agree	11	23.9
	Strongly Agree	26	56.5
My family and I often do not get enough sleep because of the flood and because I want to instantly pack up and return to normal	Strongly Disagree	1	2.2
	Disagree	4	8.7
	Neutral	9	19.6
	Agree	11	23.9
	Strongly Agree	21	45.7
In the aftermath of the flood, my family and I experienced health issues	Strongly Disagree	11	23.9
	Disagree	16	34.8
	Neutral	12	26.1
	Agree	5	10.9
	Strongly Agree	2	4.3

Discussion

All the questions can be used in the study based on the Cronbach's Alpha values, as indicated in Table 1. A good reliability value (0.889) was achieved. Additionally, it shows that the questions on mental effect have the highest reliability (0.903), which is likewise regarded as very good with a reasonably high internal consistency. However, the questions on social effect (0.609) and health effect (0.675) showed moderate reliability. Overall, the questionnaire could be used.

The students were distributed based on the flood areas as seen in Table 2 (based on states). The majority of the responders (84.8%) reside in Selangor, which was not expected to be hit by flood unlike the flood-prone states of Kelantan, Pahang, and Terengganu. This is supported by Farrah and Sharfizie (2022) who stated that prior to 2021, most of the flood-affected students' families reside in places that were not identified as flood-risk areas. Aid may also take longer to arrive because the state government is more concerned with rescue operations in places designated as flood risk areas. According to Bernama (2022), the government is

seeking long-term solutions for the flood problem. They will put plans in place to address the issue of flooding across the nation, particularly in high-risk areas. These plans include establishing water reservoirs or "riverfront reservoir cities" like in the Netherlands, creating resilient urban regions like China's "sponge cities", and relocating at-risk-of-flooding riverside communities to higher grounds. In addition to developing flood forecasting and warning systems based on artificial intelligence (AI), improving siren and flood warning systems, establishing flood monitoring via closed-circuit cameras (CCTV), and developing mud flood early warning systems, the government will also establish a National Numerical Weather Forecasting Centre. Furthermore, the 100 automatic surface weather observation stations that are currently in use but are out-of-date will be updated, along with the monitoring of deforestation activities and urban development plans which must take flood risks into account before being approved. However, a comprehensive solution necessitates substantial funding up to hundreds of billions of ringgit Malaysia and takes a long time.

Mental Effects

Table 3 indicates the level of mental effects caused by the flood on the students. Out of the five statements, the highest mean is 4.1087 namely for the statement regarding the respondent and family frequently feeling furious at the prospect of further misfortunes. The victims in this study often felt depressed due to losing their possessions and sentimental items that cannot be replaced. As shown on social media, people frequently place blame on certain parties during or after a crisis, which is supported by (Bernama, 2021). Meanwhile, the psychological effects of a disaster are significantly influenced by the idea of responsibility. Disasters that are perceived to be intentional or caused by the fault or carelessness of specific parties are perceived by the victims to be less easy to accept than disasters that are perceived to be caused by natural environmental factors (Norris et al., 2002).

The second highest mean of 4.000 is for the statement regarding the respondent and family frequently experiencing fear when it rains in the neighbourhood. Nasir et al (2012) highlighted a similar finding among Johor flood victims who experienced flashbacks of the flood and feared that it would happen again. Meanwhile, rage and pressure may be harsher when significant floods happen in regions that typically do not experience floods and when the victims realise that there are non-natural forces at play, such as poor government oversight of excessive logging or unplanned development. However, mental issues such anxiety and physical tiredness were quite noticeable. The flood victims believe that life must go on despite their feelings of disbelief, shock, unpleasantness, and fear. In general, most people become more tolerant of the effects of flooding. This resistance depends heavily on the persons who encountered it, including their life experiences and perspective of all the events that occurred (Nasir et al., 2012).

Different people have different responses to flooding. Among the general mental effects felt by the victims are shock, worry, doubt, and tension. The students and their families experienced intense anger, which may have been caused by the fact that the event was unanticipated even with the daily and prolonged rains. Additionally, they also developed anxiety whenever it rains out of fear that a flood would happen again. Green et al (1983) claimed that this worry is linked to flood-related hazards. Mental responses to stress have a substantial impact on the victim's mental health, adding to anxiety and sleep problems.

Social Effects

The responses to the social impact statements showed only a moderate impact. This may be because the respondents consist of students, so they feel less affected because they are not working. This is closely related to the findings which indicate that the respondents did not experience any disruptions to their daily routine following the flood. They also declared that they were not relocated to any temporary evacuation centres; hence, they did not experience the discomfort of being at an evacuation centre. They also did not experience the issue of job or income loss. However, 30.4% of the respondents strongly agreed that flood victims are entitled to emergency leave to enable them to clean and repair their home.

Mint (2021) also agreed that the government should excuse affected civil servants from work to clean up their house, and that the private sector should do the same. Flood-affected civil servants should also be entitled to emergency leave to enable them to make proper arrangements to return to their homes. Cleaning work following a flood may take months, during which the respondents and their family must stay elsewhere. The government understands the complexities that come with restarting life after a flood, and hence has decided to grant special emergency leave to civil servants affected by flood.

Health Effects

Table 4 reveals that 56.5% of the respondents strongly agree that the flood had left them and their families exhausted from cleaning their damaged house. In addition, 45.7% of the respondents reported that they did not get enough sleep because they were impatient to leave and resume their regular lives. According to a qualitative study on the aftermath of the 2006–2007 Johor flood by Nasir et al (2012), the victims needed to spend a significant amount of time cleaning up and repairing their homes. How a crisis affects a person psychologically is related to how they experienced and view their own lives. However, 41.3% of the respondents expressed a neutral stance regarding the statement that the flood had made them and their family depressed. Besides that, 34.8% of the respondents declared that they did not experience any health problems. Age wise, most of the respondents were between the ages of 19 and 20, indicating that they are still young and free from any health issues. Depending on age, gender, and previous flood experience, the consequences on disaster victims vary from person to person (Nasir et al., 2012). According to Davidson (2001, 2004), women are two times (10-14%) more vulnerable than men to developing PTSD (5-6%). People who live in locations where natural disasters like floods occur commonly would be psychologically and physically better prepared for the crisis. As a result, their responses would be less significant after the tragedy. However, the effects might be serious to those who reside in locations where floods are uncommon. Children, adolescents, adults, and elderly individuals who are already dealing with psychological issues including depression, anxiety, and other issues may be more affected.

Conclusion

This study offers knowledge to individuals who conduct mental, social and health tests. Most of the victims demonstrate mental issues such as anxiety about the flood happening again, and physical tiredness from having to clean and repair their homes. In addition to perceiving the catastrophe as unbelievable, unexpected, unpleasant, and worrying, the flood victims also believe that life must carry on. Most people become more resilient to the effects of flooding. This resistance depends heavily on the persons who encountered it, due to their life

experiences and perspective of the events that occurred (Nasir et al., 2012). Since all the respondents are students and not the heads of households, the influence could be negligible. The outcome can alter if the respondents are older and play a different role in the family. This is validated by an earlier research by Telles et al (2009), which showed that older adults substantially score higher for PTSD and depression than other age groups. Age-related increases in PTSD symptoms are caused by several reasons. Cook (2001) asserted that elderly persons may experience more difficult post-disaster living as they adjust to changing roles and deal with traumatic memories. In addition, people lose their functional capacity due to an increase in health problems, loss of job, retirement, decrease in income, cognitive impairment, and reduced social support.

The results generated in this study cannot be generalised and are not representative of other contexts. A thorough study with psychological testing on a larger sample that represents the general population of the victims is required to get a better and more accurate picture of how the flood has affected its victims. A comprehensive research that combines qualitative and quantitative techniques would provide a clearer understanding of the mental, social and health consequences of the flood on its victims. There should be more mental and physical preparation for facing floods after understanding its effects. People who know how to deal with and prevent difficulties brought on by natural catastrophes should offer their knowledge as social assistance.

Finally, the study further contributes to the relevant literature in mainly two ways. Firstly, it was observed that students are being less affected by the aftermath of the flooding since they have a smaller role in the household compared to the older members such as their parents. Secondly, it was also learned that the victim's individual role in the family has a substantial impact on his or her mental, social, and physical well-being. The more responsibilities an individual carry will have a heavier effect on his or her mental, social and physical well-being following a flood occurrence. Hence, future research may include flood victims of various ages and family roles to produce a more accurate national comparison.

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