



UNIVERSITI PUTRA MALAYSIA

***THE EFFECTIVENESS OF SCHOOL-BASED FLOOD
PREPAREDNESS LEARNING MODEL AMONG PRIMARY SCHOOL
CHILDREN AT FLOOD PRONE AREA OF KLANG, SELANGOR***

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ABSTRACT

THE EFFECTIVENESS OF SCHOOL-BASED FLOOD PREPAREDNESS LEARNING MODEL AMONG PRIMARY SCHOOL CHILDREN AT FLOOD PRONE AREA OF KLANG, SELANGOR

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Introduction: Most of the community in Malaysia are not aware and less in self preparation to encounter disaster. Selangor prone to severe flood and *Klang* area included in the list of flood-prone areas in Selangor. Children are the populations who are more vulnerable to experience physical or emotional illness or injury towards flood hazard. Thus, by introducing the learning model on flood preparedness to the vulnerable group, the resilient community toward hazard from flood phenomena can be developed in our country. **Objective:** To evaluate the school children's flood preparedness knowledge level following the intervention program of introducing the prototype flood preparedness learning model. **Methodology:** A Quasi- experimental study was carried out among primary school children at flood prone area of *Klang*, Selangor. A total of 110 students each for two different groups (treatment and control) was recruited in this study. Treatment group were gave intervention on introduction of learning model on flood preparedness while control group were not given the intervention. Five primary schools located at flood- prone area was randomly selected as for recruiting school children purposes. Pre and post questionnaire was used to obtain basic information and used to evaluate the knowledge levels of School-based flood preparedness before and after the introduction of the Learning model among primary school children. Each set of questionnaire have 4 sub- element which are General flood knowledge, Flood warning, assembling flood preparedness kit and Readiness of Response to Flood. **Results:** 0.743 (-0.978, 2.463) of mean difference shows no significant different on total score of basic knowledge level on flood preparedness between treatment and control group. Both group shows approximately same level of basic knowledge. ANCOVA was used to test the effect of group interaction for each sub- elements. [General Flood Knowledge] There is no significant effect of the educational learning model on introduction of knowledge to the treatment group after the adjustment of the pretesting score, $F(2, 149) = 1.227$, $p = 0.270$ ($p \geq 0.05$). [Flood Warning] There is a significant effect of the educational learning model on introduction of knowledge to the treatment group after the adjustment of the pretesting score, $F(2, 149) = 37.901$, $p < 0.001$. [Assembling Flood Preparedness Kit] There is a significant effect of the educational learning model on introduction of knowledge to the treatment group after the adjustment of the pretesting score, $F(2, 149) = 83.325$, $p < 0.001$. [Readiness of Response to Flood] There is a significant effect of the educational learning model on introduction of knowledge to the treatment group after the adjustment of the pretesting score, $F(2, 149) = 4.748$, $p = 0.031$ ($p \geq 0.05$). **Conclusion:** The finding of this study gave positive outcome on the effectiveness after the introduction of the Learning model with four sub-elements of flood preparedness knowledge among the primary school children in Klang, Selangor.

Keywords: Flood, Flood prone area, Selangor, Learning Model, School children.

ABSTRAK

KEBERKESANAN MODEL KESEDIAAN BANJIR BERASASKAN PEMBELAJARAN SEKOLAH DALAM KALANGAN KANAK-KANAK SEKOLAH RENDAH DI KAWASAN MUDAH BANJIR DI KLANG, SELANGOR.

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Pendahuluan: Kebanyakan masyarakat Malaysia tidak mempunyai kesedaran dan kurang persiapan menghadapi bencana. Selangor cenderung kepada kejadian banjir teruk dan daerah *Klang* tersenarai sebagai kawasan mudah banjir di Selangor. Kanak-kanak adalah populasi yang rentan mengalami penyakit fizikal atau emosi dan kecederaan terhadap hazard banjir. Oleh itu, dengan memperkenalkan model pembelajaran kesediaan banjir kepada kumpulan rentan, masyarakat yang berdaya tahan terhadap hazard daripada fenomena banjir dapat dibangunkan di negara kita. **Objektif:** Untuk menilai tahap pengetahuan kesediaan banjir di kalangan kanak-kanak sekolah berikutan program intervensi memperkenalkan prototaip model pembelajaran kesediaan banjir. **Metodologi:** Satu kajian eksperimen Quasi telah dijalankan di kalangan kanak-kanak sekolah rendah di kawasan mudah banjir Klang, Selangor. Seramai 110 pelajar setiap satu bagi dua kumpulan yang berbeza (rawatan dan kawalan) telah diambil dalam kajian ini. Kumpulan rawatan telah diberikan intervensi pengenalan model pembelajaran kesediaan banjir manakala kumpulan kawalan tidak diberikan intervensi. Lima buah sekolah rendah terletak di kawasan mudah banjir telah dipilih secara rawak sebagai tujuan untuk mengambil kanak-kanak sekolah. Soal selidik pra dan pasca digunakan untuk mendapatkan maklumat asas dan digunakan untuk menilai tahap pengetahuan kesediaan banjir sebelum dan selepas pengenalan model pembelajaran di kalangan kanak-kanak sekolah rendah. Setiap set soal selidik mempunyai 4 sub elemen iaitu pengetahuan banjir umum, amaran banjir, memasang kit kesediaan banjir dan kesediaan tindak balas terhadap banjir. **Hasil:** 0.743 (-0.978, 2.463) perbezaan min menunjukkan tiada perbezaan yang ketara pada jumlah skor tahap pengetahuan asas kepada kesediaan banjir antara dua kumpulan tersebut. Kedua-dua kumpulan menunjukkan tahap pengetahuan asas kira-kira sama. ANCOVA digunakan untuk menguji kesan interaksi kumpulan bagi setiap sub elemen. [Pengetahuan Banjir Umum] Tidak ada kesan yang ketara terhadap model pembelajaran pendidikan mengenai pengenalan pengetahuan kepada kumpulan rawatan selepas pelarasan skor ujian pra, $F(2, 149) = 1.227$, $p = 0.270$ ($p \geq 0.05$). [Amaran Banjir] Terdapat kesan ketara terhadap model pembelajaran pendidikan mengenai pengenalan pengetahuan kepada kumpulan rawatan selepas pelarasan skor ujian pra, $F(2, 149) = 37.901$, $p < 0.001$. [Memasang Kit Kesediaan Banjir] Terdapat kesan ketara terhadap model pembelajaran pendidikan mengenai pengenalan pengetahuan kepada kumpulan rawatan selepas pelarasan skor ujian pra, $F(2, 149) = 83.325$, $p < 0.001$. [Kesediaan Tindak balas terhadap banjir] Terdapat kesan ketara terhadap model pembelajaran pendidikan mengenai pengenalan pengetahuan kepada kumpulan rawatan selepas pelarasan skor ujian pra, $F(2, 149) = 4.748$, $p = 0.031$ ($p \geq 0.05$). **Kesimpulan:** Dapatan kajian ini memberikan hasil positif kepada keberkesanan selepas pengenalan model Pembelajaran dengan empat sub elemen pengetahuan kesediaan banjir di kalangan kanak-kanak sekolah rendah di Klang, Selangor.

Kata kunci: Banjir, Kawasan Mudah Banjir, Selangor, Model Pembelajaran, Kanak-Kanak Sekolah.

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LIST OF ABBREVIATIONS

ADPC	Asian Disaster Preparedness Center
CBDRR	Community-Based Disaster Risk Reduction
CVR	Content Validity Ratio
DRR	Disaster Risk Reduction
DID	Department of Irrigation and Drainage
EC	European Commission
PLaNS	‘Play, Learning and Narrative Skills’ Project
RDRT	Regional Disaster Response Team
RDS	Rapid Deployment Squad
SMEs	Subject Matter Expert
UNCRD	United Nations Centre for Regional Development
UNISDR	United Nations International Strategy for Disaster Reduction
USGS	United State Geological Survey
WHO	World health Organization

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- Appendix 1 Approval letter from Ethic Committee**
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CHAPTER 1

INTRODUCTION

1.1 Study Background

Malaysian has long been taught that, their strategic geographical location protects the country from major natural disasters. Yet, climate change due to global warming has caused significant changes in the country's climate activity and worsens the health, property and economic consequences which the country had never encountered before from the past 20 years. In view of this, flood is the most severe of all disaster that has happened in Malaysia.

There are many factors that influenced the flood occurrence although it is categorized as a natural disasters. Flood occurred also due to man- made factor that changed the surface structure and sub- structure of the soil. This problem often occurred in urban area where more development of building, road and parking area (Rahman, 2009).

In Malaysia, the occurrence of flood is due to the combination of natural factors and also man-made factors. Although continuous rainfall happens throughout the year from October to March during the monsoon season is predicted, the consequences of these heavy rainfall has brought to several unprecedented flood. This also due to the rapid and increasing number of urbanized areas and insufficient drainage which cannot support the amount of water flow during these heavy raining (Jani, Nasir, & Zawawi, 2015).

There are no formal categorizations of floods in Malaysia but is often generally categorized as monsoonal, flash or tidal floods (Department of Irrigation and Drainage, 2013). However, flash flood and monsoonal are flood categories that often happen in Malaysia (Rahman, 2009).

1.2 Problem statement

1.2.1 The factors and cases trend

Malaysia was known as a country that one of the natural disaster free zones which, freed from natural disasters. Nevertheless, past study suggested that climate change is an unavoidable evolution process happen to its nature, frequent monsoon flood in some parts of Southeast Asia for this past year remain issue to be overcome, where it give impacts to lives and properties (Loo, Billa, & Singh, 2015).

Given Malaysia's geographical location, most floods that occur are not only the natural result of cyclical monsoons during the local tropical wet season which are characterized by heavy and regular rainfall from roughly October to March, but also due to inadequate drainage in many urban areas also enhance the effects of heavy rain, though efforts are underway to resolve this problems.

Flood vulnerability associated with poverty appears seems difficult to experience changes (Chan, 2012). However, according to Jamaluddin (1985) in his study on 'Flash Flood Problems and Human Responses to the Flash Flood Hazard in Kuala Lumpur Area' claimed that the cause is by urbanization, socio- economic activities and the behavior pattern of residence.

Loss and damage of properties, loss of number of lives, decreasing quality in human health due to the communicable disease are all arises as a result of flood. The effects from the impacts caused the development process of the country will be severely sets back. Climate change, global warming, rapid urbanization and socio-economic activities are the significant factors that make the world vulnerable to flood. Table 1 below summarizes the major flood following heavy rainfall in Malaysia from the past 5 years.

Table 1.2.1: Record of major flood happened in Malaysia from year 2010-2016

Year	Events
November 2010	Kedah and Perlis flooded due to heavy rainfall after a tropical depression. Around 50,000 people were evacuated, the floods contaminated water supply in Kedah and Perlis, rice production and road access
December 2012	More than 10, 8000 people displaced due to flood in the east coast of peninsular Malaysia. A total 52 flood relief centers were opened all over Terengganu.
December 2013	Massive flood at east-coast of Peninsular Malaysia, a total of 13,237 people throughout Terengganu were evacuated. School, hospital, household are all affected.
December 2014	Northern and Eastern states of Kelantan, Terengganu, Pahang, Perak and Perlis in Malay Peninsular were hit by flash floods. A total of more than 20, 000 community affected due to the unexpected worsen condition.
January 2015	High intensity rainfall since 17 January 2015 caused major flooding across several parts of Sarawak and Sabah. Around 13,878 people had been evacuated
February 2016	Around 4,600 people have been evacuated in the state of Malacca with 3,020 victims were housed at six evacuation centers on Central Malacca District, 1,560 victims sheltered in six evacuation centers on Alor Gajah District and another 24 victims at one relief center in Jasin District.

Figure 1 shows the data of lists of disaster that have happened in Malaysia. The data shows the most frequent disasters that happened in Malaysia was flood, and flood occurrence in second ranked for mortality due to the disasters and also flood was in first ranked for the economic issues cause by disasters. This data was according to the International Disaster Database www.emdat.be Université catholique de Louvain Brussels - Belgium. (2015).

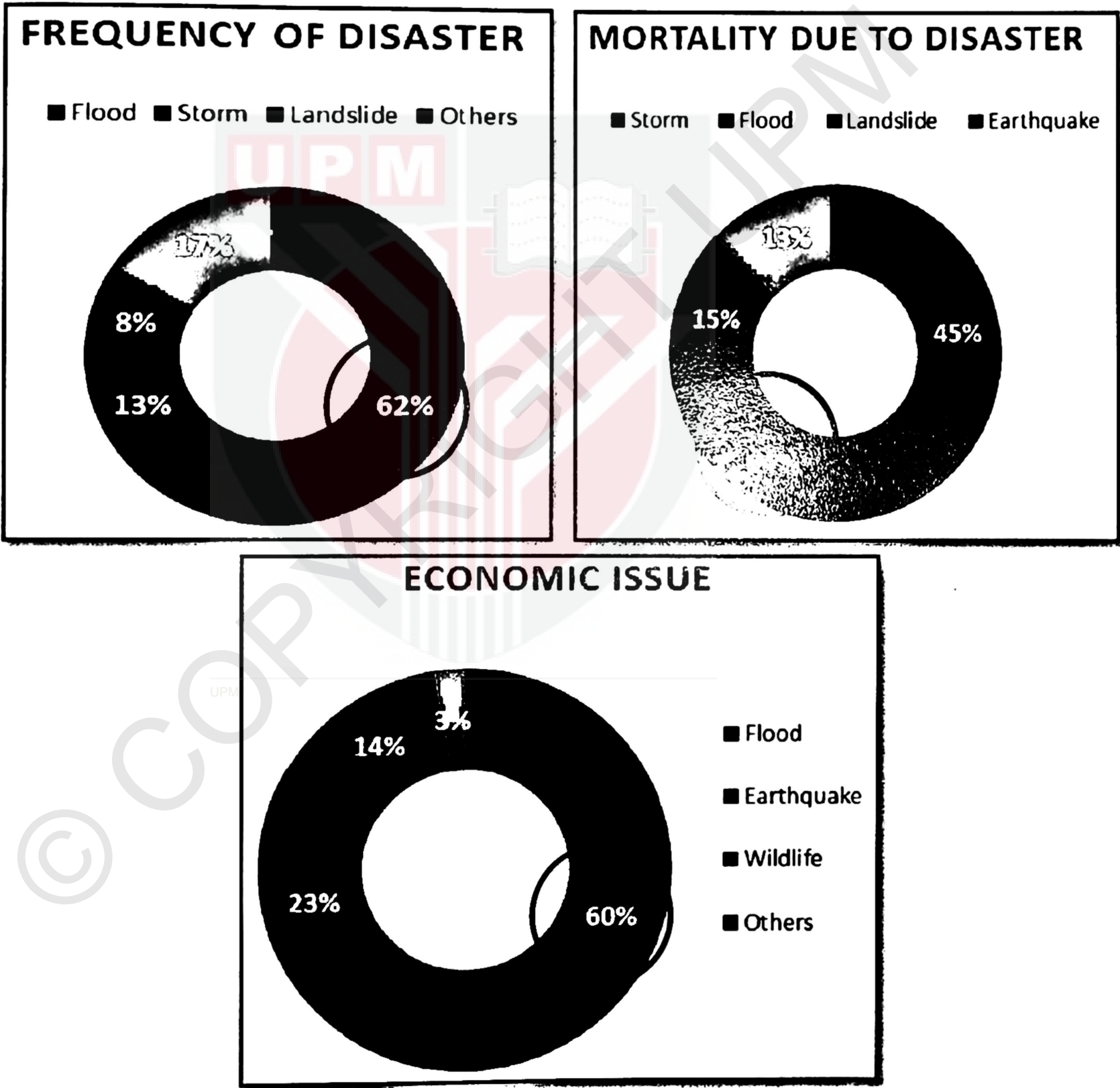


Figure 1.2.1: Data of the frequency of the disasters happened, the mortality due to the disasters and economic issues happened due to the disasters.

1.2.2 Selangor as flood prone area

According to MalaysiaKini (2017) stated that the hardest state that hit by flood in Malaysia are usually Kelantan, Terengganu, Johor and Sabah. Apart from other states, Selangor also prone to severe flood. Selangor also ranked third for total of victim evacuated during flood. In Addition, *Klang* area included in the list of flood-prone areas in Selangor which stated by the Department of Irrigation and Drainage Selangor (2015).

According to Utusan Online (2012) about 5, 000 students affected in 8 schools in *Klang*. Deputy state director of education said that all the eight (8) schools ordered to be closed due to the increased level of flood water in the schools. The flash floods hit the *Klang* was the second in three days. The flood victims around the area said that in 2015 almost eleven times the water increased into the residential area. The situation has caused discomfort among the people because they have to move to a safer area and clean up their homes (Sinar Online, 2015).

In Selangor there are seven (7) river basins including Sungai Bernam, Sungai Tengi, Sungai Buloh, Sungai Klang, Sungai Langat and Sungai Sepang / Sepang kecil. Each of the river basins have own natural geography structure. As for the *Klang* river basin, it was located in the central part of the west coast Malaysia.

Reasons for flooding can be divide into three which are meteorological, hydrological and anthropogenic (Shahirah, 2012). In Selangor most of the factors was due to the anthropogenic which refers to the factors cause by human activities in water catchments which definitely increase the extent and recurrence of floods in various ways. This was due to the fact that most of the *Klang* River basin is the region's which rapidly developed and most densely populated in Malaysia where the Klang Valley and Kuala Lumpur is located (Laporan Tinjauan Kajian Rancangan Struktur Negeri Selangor 2035).

1.2.3 Children as a vulnerable group

Floods will occur no matter where and who will be affected by it. Schools as a public space for our children have served as the vulnerable place when hit by flood. The impact would have been unimaginable if the disaster occurs during school hours. Children are a group of community that vulnerable to the danger of flood disaster. They are still in a phase where they cannot be independent and still need the help of parents and adults to help them.

They would be in danger if they are facing the flood situation without parents or adults with them for help, and without any knowledge and preparation in response towards flood disaster. Thus, the question arises as to how ready the school and our children prepare in response to cope with next flood disaster.

The need to overcome the problem of flood phenomena that affect the health and well-being among the vulnerable group especially children, is the priority for most developing countries. It required a proactive approach to build a resilient community by transferring knowledge and inculcate right attitude and behaviors in response to the flood disaster. To address this issue, a learning model which could use by the school as an educational tool to deliver the flood preparedness information among the school children was conducted in this study.

1.3 Study justification

1.3.1 Learning model as a medium

As an education institution, school has the responsibility to deliver education. It is an effective platform in transferring information, knowledge and skills to the surrounding communities. However, due to packed syllabus and schedule, classroom- based education may no longer suitable to be implemented for community- based learning.

In order to deliver the information effectively, knowledge and skill more efficient and effective to the community, different modes of educational approaches is needed. Since, the problem of our community is not getting efficient to learn disaster preparedness, by using educational toolkit (learning model) as a medium; the knowledge is believed to be delivered more efficient and effective. In accordance to this, a random survey among tertiary school students suggested that, they would like to learn more on the necessary preparedness knowledge and response skills in school

as where they spend most of their time. Therefore, it is advisable that school has a tangible role in building community resilience (How et al., 2015).

Based on the Community- based Disaster Risk Reduction (CBDRR) approaches as proposed by the Sendai Framework (2015- 2030), this study is to implement two core principles which are (i) sustainable learning, and (ii) participatory approach. Building the awareness and inculcating the best behavior on (flood) preparedness and response to the school-community is seen as the strategy to communicate the risk with the school children. School as the nurturing and supportive environment could help children cope with adverse situations, and contributes to building their resilience. Therefore, the activities of disaster education by using learning model in school are an efficient and effective strategy in spreading out the disaster education.

1.3.2 Children age 9 years old as respondents

According to the theory of Erik Erikson (1963), children at the aged of 5 to 12 years are at their best stage of absorbing information through reading, seeing, listening and feeling. Besides, the intellectual development of children at the age of 6 to 9 years old are most likely to readily engage their bodies and the minds to learn new things through experience.

In other words, learning new information with the assist of learning model will allows children to observe and reflect, forming concepts, testing new situations and gaining experience more effectively. Therefore, children at the age of 9 year old are considered as the target group who should be inculcated the flood preparedness and response knowledge with the aid of the learning model.

1.3.3 School as platform to transfer the knowledge

A school has been regarded as one of the safest learning building for our future generation. Nevertheless, the safest learning space has changed ever since affecting by flash flood due to its un-strategize location along the river basin.

For instance, on 27 January 2017, worsening floods in Terengganu has forced the closure of 27 schools, as the heavy rain during the monsoon season hit the east coast of peninsular Malaysia. Many of the schools had been flooded by flood waters, and some roads linking to the schools had been cut off. Schools were challenged to operate normally during and after a flood.

Schools play a vital role in every community (Birkland, 1997; Shaw & Kobayashi, 2001) and they need to be well secured and protected. The effects of disasters on school facilities must not be seen only in terms of the need to prevent catastrophic damage that may destroy the buildings but also in terms of preserving the lives of children during disasters. The concept of school safety is not limited to

preventing the collapse of school buildings in disasters, and ensuring the safety of teachers and students, but rather extends to disaster risk reduction (UNCRD 2009).

The concept of school safety was given a major focus by the UN International Strategy on Disaster Reduction (UNISDR) during the 2006–2007 World Disaster Reduction Campaign, with the theme ‘Disaster reduction, begins at school’.

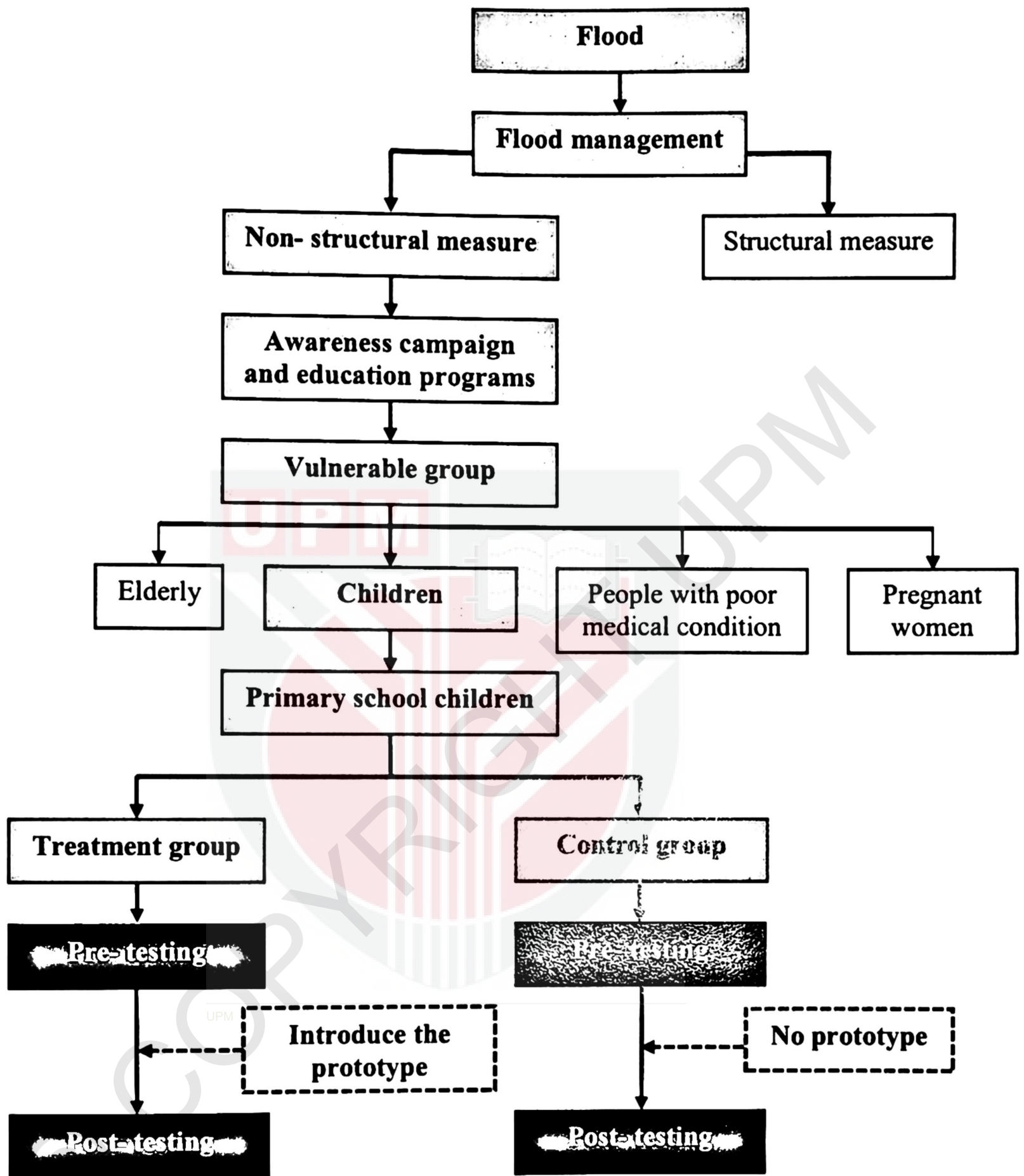
This theme was chosen by UNISDR because it is in line with the Priority 3 of the Hyogo Framework for Action 2005–2015, which states that ‘Use knowledge, innovation and education to build a culture of safety and resilience at all levels’ (UNISDR 2007:9) and because schools are the best venues for forging durable collective values and therefore suitable for building a culture of prevention and disaster resilience (ADPC 2007).

1.4 Conceptual framework

Figure 1 shows the conceptual framework which shows summary of this study. These conceptual framework is the summarization of the study on the effectiveness of school-based flood preparedness learning model among primary school children at flood prone area of Selangor. This is used to assist the researcher in conducting the study.

From the figure, flood is the major problem to be studied and focusing on the flood management of the awareness campaign and the educational programs among primary school children. Flood management can be classified into two measures which are non- structural and structural measures. However, this study only focusing on the non- structural measures. Among all the common non- structural measure implemented by the local authority, is aim to minimize the flood threat against the local community through the awareness campaign and education program.

According to this, the study is focusing on the group that vulnerable towards flood risk which is children. This group of children specifically taken from schools that located in the flood prone area at the age of 9 year old. There were two groups of students respectively which are the treatment group and control group. Both group undergo pre- testing by giving them a set of questionnaire. After that, students in the treatment group were introduced with the prototype of the flood preparedness learning model, while the control group receive no treatment over the same period of time. After 1 week, a set of questionnaire again was given to both groups as the post- testing to determine their knowledge level on the flood preparedness.



■ : Dependent variable (post- testing knowledge level)

■ : Independent variable (pre- testing knowledge level)

Figure 1.4: Conceptual framework

1.5 Definition

1.5.1 Conceptual definition

Flood

Flood can be defined as temporary covering of land by water as a result of surface waters escaping from their normal confines or as a result of heavy precipitation (Kron, 2005).

Flood management

According to Department of Irrigation and Drainage of Ministry of Natural Resource and Environment Malaysia (2016) stated that flood management is the approach which focus on providing immediate flood relief works as well as to implement major flood mitigation projects to catch- up with continuous and intense urban development. The mitigation measures are divided into structural and non-structural. All the measures are including the projects that have been done by the local authority to increase the flood relief and reduce the flood damage.

Flood prone area

The flood prone area is defined as the area adjacent to the stream that is flooded or saturated when the elevation of the water is at twice the maximum depth at bankfull stage (Rosgen, 2002).

School children

According to the Oxford English Dictionary (2016), school children is define as a child attending school.

Prototype

According to Merriam Webster (2017), prototype is an original model on which something is patterned. In the other word, prototype also defined as original pattern or model of which all things of the same type are representations or copies.

According to Budde et al. (1992) prototyping includes creating early working versions (prototypes) of the future application system or products and experimenting with them.

1.5.2 Operation definition

Flood

According to this study, flood is defined as the disaster situation caused by natural disasters nor caused by excessive development or urbanization which then causing the drainage systems in certain areas would be worsen and poor and thus causing floods that can threaten the life of the community.

Flood hazard

Hazard is any sources that will potentially damage, harm or give adverse effects on individual under certain condition. According to this study, in the terms of flooding, the flood hazard is divided into biological and safety hazard which resulting from the flood. The hazard will cause harm or will affect the flood victim on their health condition, safety or damage their properties.

The sources of biological hazard may include bacteria, viruses, insects, or animal's carcasses. These sources can cause a variety of health effects such as skin irritation, allergies and infections. In addition, the safety hazard can occurred when entering the flood area. The hazard may include the submerged debris such as nails, broken glass, or sharp metal. The safety hazard can caused serious body injuries to the flood victim.

Community- based flood preparedness

Communities in Malaysia are still lack in awareness and preparedness during the flood occurrence as they has long been taught that the geographical location of the country are protected from major natural disasters. Jani et al. (2015) stated that there are still lacking in awareness and preparedness during the flood.

Besides that, some improvement are required on the facilities at the flood relief centre since it considered as inadequate. In order to increase the level of awareness on preparedness among community, various flood awareness programmes can be performed. Thus, the community will be prepared for any disaster such as flood event that unpredictable and become more resilience.

Children as a vulnerable group

Disasters can happen without warning. Community need to be prepared for the eventuality of a disaster happening. When disaster happen, the priority of the emergency preparedness and the rescue usually on vulnerable group. Vulnerability is the degree to which a population, individual or organization is unable to anticipate, cope with, resist and recover from the impacts of disasters (WHO, 2016).

According to the World Health Organization (2016) stated that children, pregnant women, elderly people, malnourished people, and sick people or immunocompromised, are often classify as vulnerable when a disaster happen. In term of this study, children was chosen as the respondent as. The schools children at the age of 9 years old are believe to not have any awareness on emergencies preparedness during disasters. Thus, Children with the age of 9 years old which school in flood prone area in Selangor state is selected.

Knowledge transfer

According to Unicef & Pigozzi (1999) Basic education involving a combination of essential competencies, knowledge, skills, and attitudes that functions as the basis of any individual's lifelong learning. Education has a critical role to play in preventing emergencies. In order to make the process of learning more affective and not as a short-term response, the school children are the best target population for the interaction of learning.

The education activities will be contributed to preparing the school children for their lifelong learning if emergency happen in or out of the school. Knowledge transfer are affective while early years of children life, since the early years of a children are the basis for their future.

1.6 Objectives

1.6.1 General objective

To evaluate the school children's flood preparedness knowledge level following the intervention program of introducing the prototype flood learning model.

1.6.2 Specific objective

1. To develop the prototype of school-based flood preparedness learning model for primary school children at flood prone area in Selangor.
2. To determine the flood preparedness knowledge levels among the treatment and control group of the school children before the intervention program.
3. To determine the flood preparedness knowledge levels following the intervention program of introducing the prototype flood learning model among the treatment and control group of the school children.
4. To evaluate the effectiveness of the knowledge transfer of flood preparedness among treatment and control group after the intervention program.

1.7 Hypothesis

The knowledge levels following the intervention program of introducing the prototype flood learning model among the treatment and control group will be significantly different among the school children

CHAPTER 2

LITERATURE REVIEW

2.1 Flood

Flood can be define as “temporary covering of land by water as a result of surface waters escaping from their normal confines or as a result of heavy rainfall” (Kron, 2005). Some define flood in wider definition. European Commission (EC) define flood as “flood means temporary covering by water of land not normally covered by water” (Commission of the European Communities, 2006).

Although in Malaysia there are no formal categorizations of floods. According to some study, they classified flood in several types. Floods are usually classified in three main types which are river flood, flash flood and storm surge (Berz et al., 2001; Jonkman, 2005; Kron, 2005; Perry, 2000). To differentiate the type of floods is by considering the size of area affected and duration of the rainfall. This two element also define as the spatial and temporal scale of flood occurrence (Bronstert, 2003).

River flood happen when excessive rainfall in long term which cause river to exceed its capacity. Weather and soils conditions, measures for flood protection, land use are some of the several factors that can cause river flood. Flooding occurs depends on the country itself, this is because each country has different seasons. For example in European countries, floods will always associated with seasons.

Regional high rain quantities are triggered usually in summer or autumn season. Increase in flow and runoff happen when the ground already become saturated and exceed the capacity of water in soil. Meanwhile, winter or spring season can lead to river flood also due to the large- scale of rainfall and somewhat related with snow and ice melt (Barredo, 2007).

Flash flood are also one of the most dangerous natural disasters related with weather in the world. Flash flood are the result from intense rainfall over a small area within a short period of time usually less than 6 hours. Water will rise up and fall rapidly (USGS 2005). Rainfall intensity, rainfall duration, surface conditions and topography and slope of the receiving basin are factors that contribute to flash floods (Perry, 2000). This is the type of flood was also occurred in Malaysia. Most of the tropical countries will suffers from this flood occurrence, since the weather conditions which often rains

Storm surge is an abnormal rise of water caused by a storm. Storm surge is not common event of flooding. Storm surge is the type of flood which water that is pushed onto dry land by onshore winds or storms (Perry, 2000).

2.2 Flood management in Malaysia

According to the Department of Irrigation and Drainage in Malaysia, the flood mitigation Policy and Strategy consists of Structural and non- structural. Structural measures was involving the building of structure which aim for “controlling” the flood. While, the non- structural mitigation measures was aim to reduce the flood impacts for example the flood forecasting and warning system to the public. The government of Malaysia were conducted a lot of flood mitigation but mostly on structured mitigation measures and canalization of river is one of the mitigation conducted (Chan, 2012).

In Malaysia, structural mitigation measure is a solutions that dominate Malaysian official flood management. Dredging and deepening major river channels are one of the examples of the solution which appear effective but use a lot of money and put a tremendous strain on available resources. Besides that, drain are maintained and improved in urban areas especially in area that frequently become a flooding area also one of the examples. Despite the popularities and the widespread of usage in Malaysia, the structural mitigation measures also have a limitations and was not unfailing (Chan, 2015).

Although many of flood mitigation measures and strategies was done by the government since Malaysia is one of a country that almost every year will affected by flooding, it seems not overall successful to reduce floods and its impact, due to many factors which are outdated reactive approach based on evacuation, low resilience of floods on government agendas, nature of bureaucratic in government agencies, lack of interaction and cooperation among government agencies, relief and rehabilitation and the victim reluctance to relocate from the flooding area (Chan, 2012).

2.3 Flood preparedness among community

Awareness and preparedness among community during the flood occurrence still in the low level although most of the community that live in flood prone area aware that their residential area is at risk with flood occurrence. The level of awareness towards flood occurrence among community is directly proportional with the level of preparedness in facing the flood occurrence (Jani et al., 2015).

2.4 Disaster risk reduction

According to and the Sendai Framework (2015- 2030) and also the Globally Disaster Risk Reduction (DRR), they were identify that knowledge and education on Disaster Risk Reduction as one of the five priorities for actions in order to achieve disaster resilient communities and nations, such that:

1. Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation;
2. Identify, assess and monitor disaster risks and enhance early warning;
3. Use knowledge, innovation and education to build a culture of safety and resilience at all levels ;
4. Reduce the underlying risk factors; and
5. Strengthen disaster preparedness for effective response at all levels.

As priorities (3), it is crucial to appoint school as one of the social institutions where learning takes place and also children which considered as the most vulnerable to disaster risks are in this place.

2.5 Vulnerable group towards disaster

According to Office of Disaster Preparedness and Management of Government of the Republic of Trinidad and Tobago (2013) Vulnerability are describe as characteristics and circumstances of a community, system or an asset that make it susceptible to the damaging effects of a hazard. Besides that, many factors that influenced the vulnerability to hazards includes the age, income, the strength of social networks and the neighborhood characteristics (Flanagan et al., 2011).

Such that, people that poor will be more vulnerable towards disaster hazard. It has similar findings for racial and ethnic minorities; children, elders, or disabled people; and also residents of certain types of housing area (Morrow, 1999). This shows that children is include in vulnerable toward disaster hazard and one of the susceptible group towards disaster. The most vulnerable people are likely those who in needs but not sufficiently considered in the planning of local response and relief organizations (Flanagan et al., 2011).

2.6 Children

Many study stated that children are vulnerable population. Children need help when disaster happen unexpectedly. These needs in disaster planning will help them better cope with life following the disaster. At this age, children is physically and emotionally depending on adult to help them in their live. For instance, when they are not capable to do anything in any emergency situation if happen. If this situation happen unexpectedly, the children will turn to the adults to help and keep them safe. This

means child care providers, educators, afterschool providers, coaches and other caring adults need to be prepared with disaster plans that include knowledge of how to respond to disasters, evacuation plans, and safe and efficient family reunification plans.

Children are more susceptible toward hazards that cause by disaster. This is because children is still in the development of their bodies and brains. Besides that, their skin is thinner, they breathe more are per minutes and they need to eat more often and need more nutrition also they need more fluids per pound of their body. Since they are still in development of their body and brains, the understanding of children are more limited than adults, this is why children will need help from adults or their parents. Preparations for disasters need to include not only survival kits including first aid supplies for the physical body, but also teaching children (and their adults) stress reducing coping skills for positive mental health.

Disasters and traumatic events will affect all of us, but can have a mostly traumatic effect on children. The good news is most children will recover, especially if the adults in their lives take the steps before, during and after the event to provide basic protective factors and to restore or preserve routine in their lives.

2.7 Learning model

Lucy Ward (2016) stated that head of the Lego Foundation once claimed that children should play until the age of 8 years old, play-based methodology makes a lot of sense since they identifies five basic types of play such as physical, symbolic, with rules, with objects, and pretense. Where each will develop variety of skills. She also said that children will become more open and try to learn different thing in a positive ways.

A Cambridge University project which funded by the Lego foundation found that narrative and writing skills, as well as interaction and cooperation will be developed with play in their project called the 'Play, Learning and Narrative Skills (PLaNS)' Project. They found that Children which involved in the project improved in writing. The children produced creative stories and writing skill improve since they wrote longer. This can be proven the power of play or learning using model (hands-on) can help the child to understand more easily and improve writing aspects such as, spelling, paragraph composition and text coherence.

On top of that, from the project also improve the collaboration skill between the children. The children were actively engaged and playful when working together between them and showing more "good group work" skills (Whitebread & Basilio, . 2015).

2.8 Developing a prototype

According to Yang & Angeles (2005) developing of prototypes is a very important aspect of a product design process. Kojima (1991) stated that prototypes also can be described as a “designer’s multi- dimensional expression” which means to express the designer ideas in accurate and exact manners to others.

Prototyping is important to anticipate how the products been produced and developed as efficient as possible. Prototype mostly been used to test and measure the final design (product) within the appearance and pre- production stages, according the design requirement and to ensure that it functions within the appearance and pre- production stages (Isa, 2001).

According to Ulrich and Eppinger (2012) this study was close with the “Hard model” category. Hard model was technically nonfunctional but yet close models or replicas of the final design/ products. This model appearance also look and very realistic which developed from wood, dense foam, plastic or metal are painted and textures. It also have some features which can work such as such as button that push or sliders that can move.

CHAPTER 3

METHODOLOGY

3.1 Study location

This study was conducted at the flood prone area in Klang, Selangor. The study location consist of five (5) primary schools which located along the Klang River.

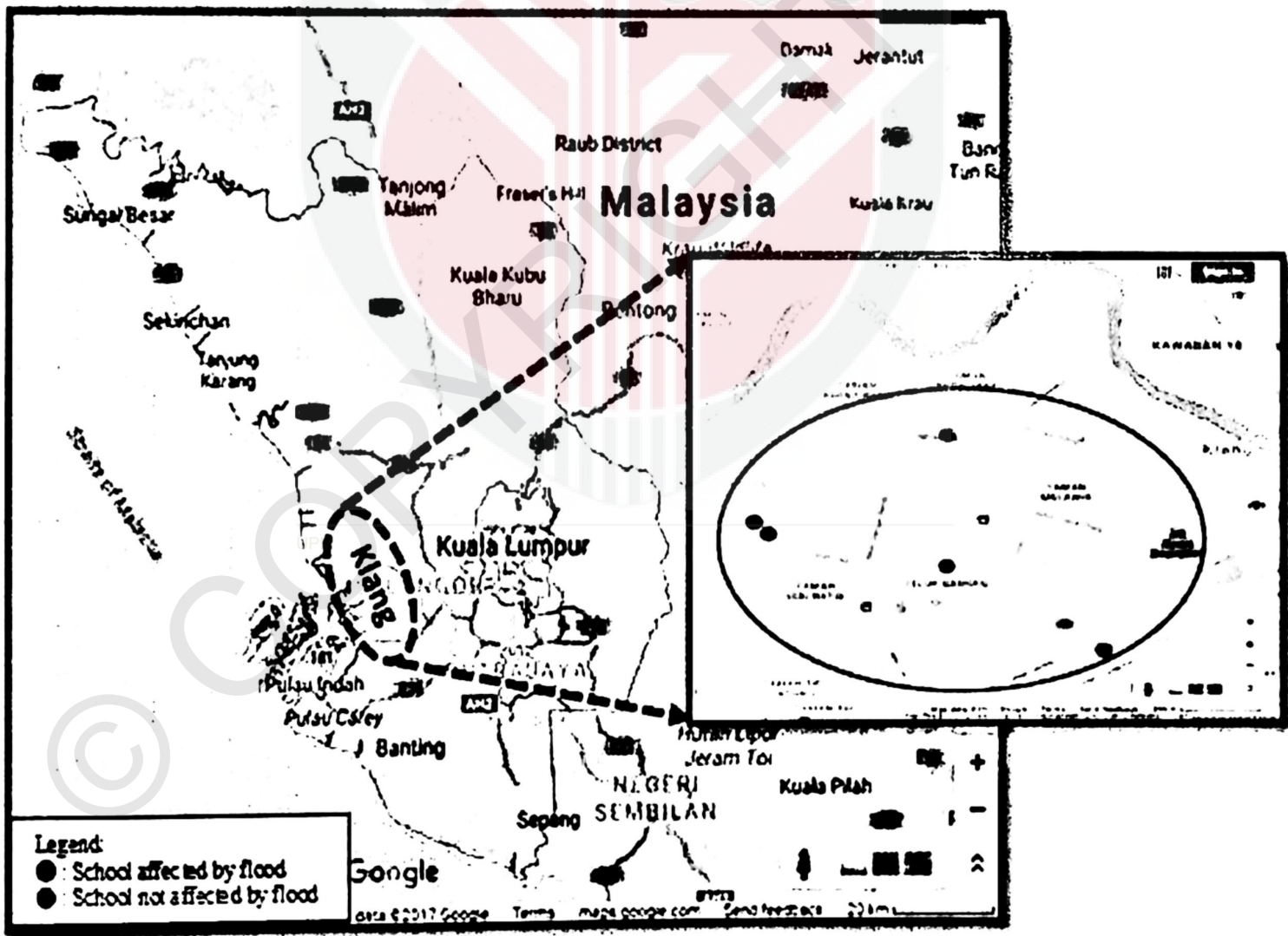


Figure 3.1: The study location area

A total of 37 “hotspots” have been identified as area that affected by serious flash floods by the Selangor state government. Although as much as 134 million ringgit has been allocated for flood mitigation work and upgrading of drainage systems and retention ponds, 40 locations in Selangor still experienced flooding during rain storm so far in year 2016 (theStar, 2016), among all are along Klang river in Klang Valley, along Gombak river in Klang Valley, and along Damansara river in Shah Alam. In view of this, five primary school which located in Klang, Selangor was selected as for recruiting school children purposes.

3.2 Study design

This is a pre and post-test Quasi-Experimental study which aims to use the prototype of flood preparedness learning model to determine the effectiveness of knowledge transfer among primary school children whose school located at Klang, Selangor.

3.3 Study sampling

3.3.1 Sampling population

The respondents of this study were among 9 years old of primary school children whose school at Klang, Selangor.

3.3.2 Sampling frame

The sampling of this study was obtained from the updated school name list from official website Education Department of Selangor. In addition, the student name list was obtained from the school principle of the selected schools.

Inclusion criteria: Male and female student at the age between 9 years old and have signed consent letter to agree the student from participate in this study from their parents.

3.3.3 Sample size

This is a pre and post-test Quasi- Experimental study which aims to determine the flood preparedness knowledge among school-age children of 9 years old with the aids of the prototype learning model. A pre- and post- test of knowledge differences were be compared to evaluate the effectiveness of the developed prototype learning model.

Measure: The differences of flood preparedness knowledge level among the school-age children after knowledge delivering with the prototype learning model.

Analysis: Comparisons of proportion difference between pre- and post-knowledge level using paired t-test at 5% significance ($\alpha=0.05$)

Hypothesis: There is a significant difference of students' knowledge levels after implementation of interactive learning tools in the learning institution (Ebner & Holzinger, 2007).

In summary,

$$\sigma = \text{Standard Deviation} = \frac{\sigma_1 + \sigma_2}{2} = \frac{1.425 + 1.08}{2} = 1.25$$

$$d = \text{difference in means, } \mu_1 - \mu_2 = 3.95 - 2.72 = 1.23$$

$K=10.5$, assuming that there will be 90% of increase in the overall knowledge level among students after learning flood preparedness knowledge with the aids of prototype learning tool.

The number of students required for each group (control and treatment) is given by,

$$N = 2 \times K \times \left(\frac{\sigma}{\mu_1 - \mu_2} \right)^2$$

$$N = 2 \times 10.5 \times \left(\frac{1.25}{1.23} \right)^2$$

$$N=21.68$$

Therefore, it is estimated that a minimum of 22 children shall be recruited from each school (standard 3). Since, there are treatment and control group to be compared $(22 \times 2) = 44$ children should be recruited in this study. While considering sampling at five schools which all located at Klang, Selangor, a minimum number of total $(44 \times 5) = 220$ children shall be recruited from five schools.

3.4 Developing the prototype

The objectives of prototyping should be made from the start of the process. These may be to construct a 3-D physical prototype which align with the learning model content objectives. The next stage in the process is to develop the prototype with decide what to put into. After the prototype was developed, the pre- testing of the prototype undergo among the school children. Its purpose is to test and improve the prototype based on the response given by the school children.

After that, the final stage of the process was prototype evaluation. The prototype was improved based on the comments during pre- testing. The establishment must be made after pre- testing among school children and the prototype objectives should be used to derive a plan for evaluation.

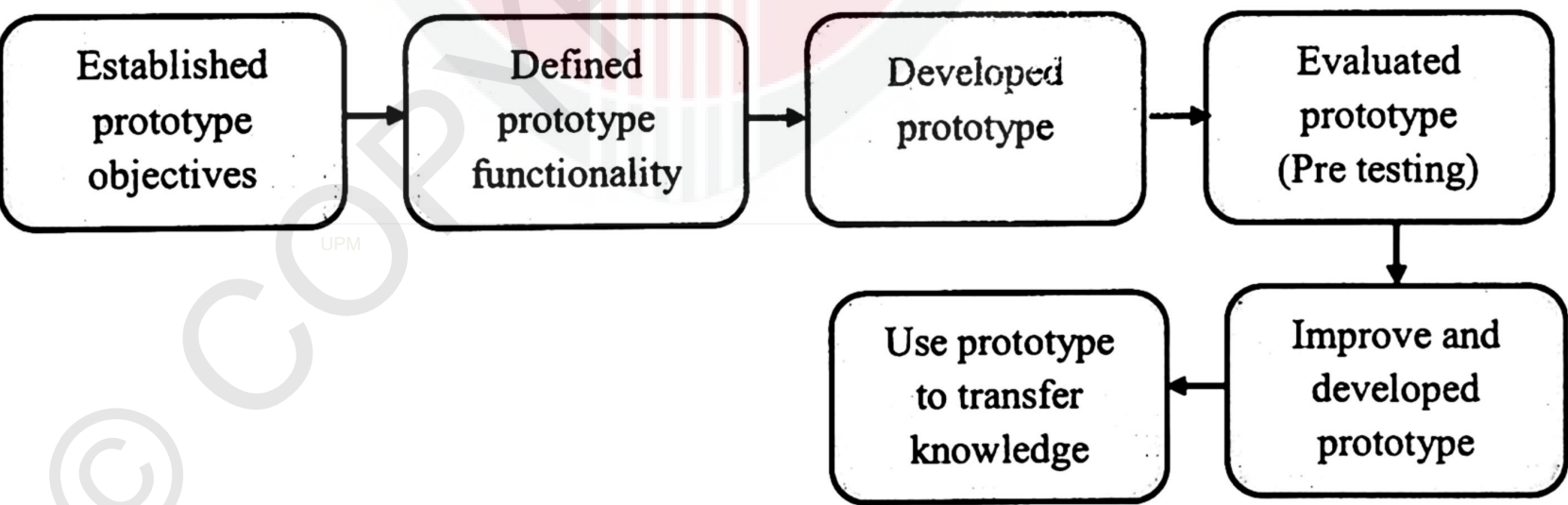


Figure 3.4: The process of prototype development
(Adapted from Sommerville, 2011)

3.5 Study instrumentation

3.5.1 Questionnaire

Questionnaire was used as a tool to get socio-demographic background information from the respondents. Each respondents are required to answer twice the questionnaire before and after the knowledge transfer session with the aid of the prototype flood preparedness learning model. These pre and post- questionnaire consist of 2 sections. The first section (section A) describes about the respondents socio- demographic status, for examples, gender, age and race.

The second section (section B) describe about their knowledge regarding flood- preparedness. In section B there are 4 sub- sections. Each sub- sections introduced questions which more specific according to the learning module of this flood- preparedness prototyped learning model as discuss in Section 3.4.2. The questionnaire is presented in Malaysia language with sentences that easy to understand. (Refer Appendix X: Questionnaire).

In order to ensure the quality assurance of the questionnaire, both validity and reliability test were conducted before the commencement of this study. Refer Section 3.6 for details of the quality control for this study.

3.5.2 Teaching model

The prototype of the flood preparedness learning model was developed based on the teaching module as recommended by the School Emergency and Disaster Preparedness Guidance Notes developed by UNISDR Asia and the Pacific (2010). It aims to strengthen child protection capacities in risk prone contexts. A post-learning evaluation test using post- questionnaire were performed to re-evaluate the knowledge of students' towards flood disaster.



Figure 3.5.2: The prototype flood preparedness learning model (aerial view)

First, the researcher share the knowledge of flood preparedness on the playing session using prototyped learning model with the aids of play cards, which then students were evaluated on their knowledge towards flood disaster after the session. This section is to understand the knowledge of students and their preparedness of flood in the community.

The prototyped of learning model is developed based on the teaching module which consists of four (4) sub elements:

Table 3.5.1: The learning model and its content.

Learning model	Learning content
Sub- section 1: General flood knowledge	This section aims to provide a description of the meaning of floods and flood situation reflects conditions.
Sub- section 2: Flood warning	This section is intended to provide information and explain about a flood warning to children.
Sub- section 3: Assembling flood preparedness kit	This section is meant to teach children how to Prepare ‘flood preparedness kit’ with its purpose and give examples of items that should be in the ‘Flood emergency kit’.
Sub- section 4: Readiness of response to flood	This section is to summarize of all the previous 3 sections. This section is meant to explain to the children how a ‘Hero’

3.6 Study Flow Chart

This study used the pretest-posttest Quasi-Experimental design to test the effectiveness of the intervention program following the treatment (introduction of prototype of flood-preparedness learning model). In this study, two groups of student age 9 whose school located at the flood-prone areas of Klang, Selangor will be chosen. One group is given the intervention (treatment group) and the results were gathered at the end of the intervention program, the other group (control group) receives no intervention over the same period of time.

Figure 4 shows the study flow chart which explain the process of this study. Step 1 is the knowledge acquisition. In this step, researcher searched and gathered any information and knowledge importance to highlight for flood preparedness purposes, in order to develop the prototype of the learning model and questionnaire. With that, then proceed to step 2 which is the developing the prototype and questionnaire based on the knowledge and information acquired.

For step 3, the pre- testing of the prototype and questionnaire undergo among the school children. Its purpose is to test and improve the prototype based on the response given by the school children. While the pre- testing of the questionnaire is to ensure all questions that asked in the questionnaire was understandable by the school children and suitable with the prototype use. Proceed with step 4 where the prototype is improved based on the comments during pre- testing in step 3.

Next, step 5 was to gather the basic knowledge regarding the flood preparedness among the two group of students. This pre- testing using questionnaire. The treatment is given the intervention and the control group remained no intervention over the same period of time. In step 6, the prototype of the flood preparedness was introduced to the students (treatment group only).

For step 7, post- testing will be done. A set of questionnaire is given to both of the group after 1 week. Its purpose is to compare the pre and post testing to know the effectiveness of the knowledge transfer of flood preparedness after using the prototype as the learning model for flood preparedness. The last step is step 8, in this step, the statistical analysis were to analyze the data according to the specific objectives of this study.

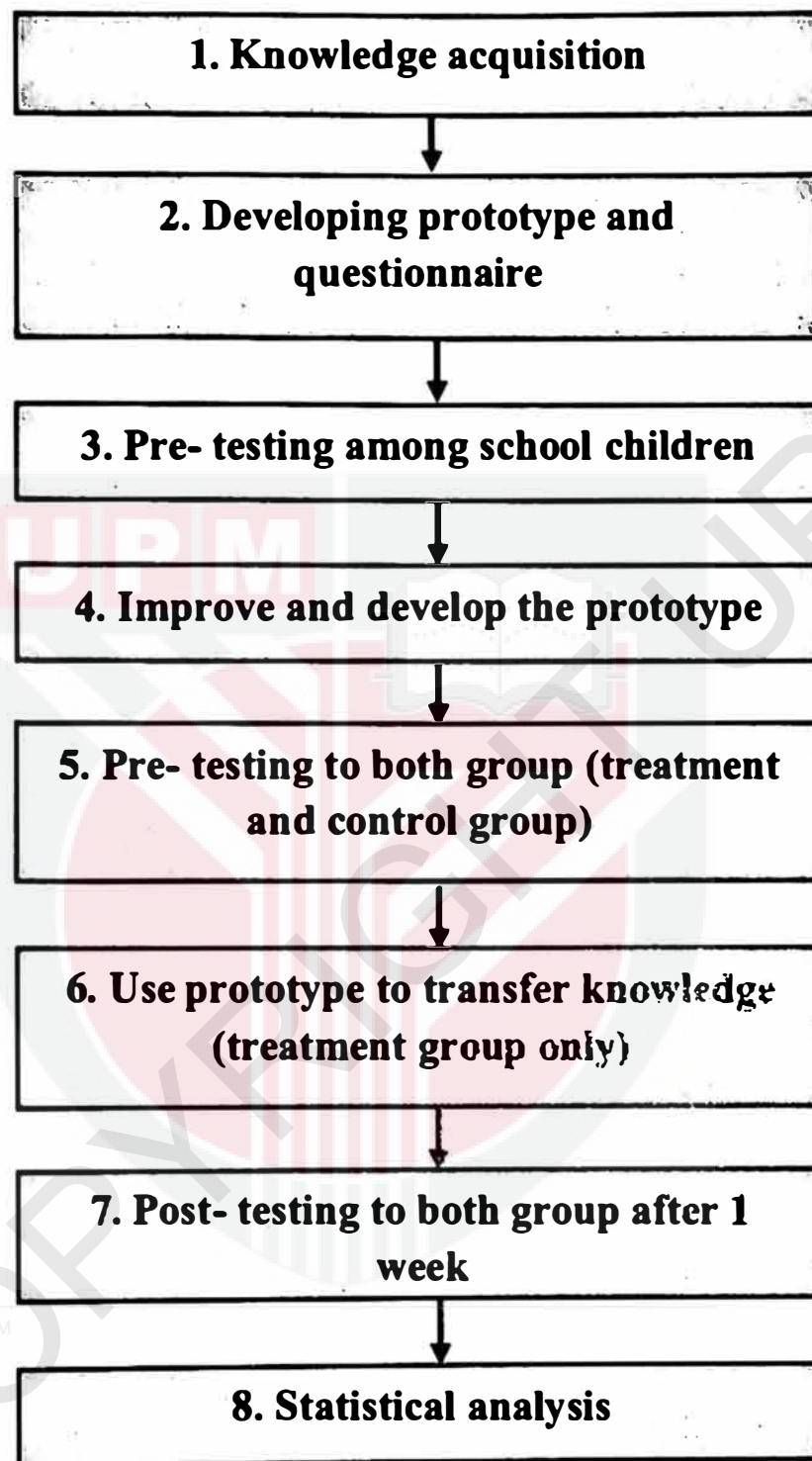


Figure 3.6: Study flow chart

3.7 Quality Control

The validity test of the questionnaire will be examined to ensure the questions items are getting measures as accordance to the study objective. In this context, content validity will be performed by letting the recognized subject matters experts to evaluate whether test items assess defined the content of the study. A total of seven (7) subject matters experts were validated this questionnaire such that,

- Regional Disaster Response Team (RDRT), International Federation of Red Cross
- Rapid Deployment Squad (RDS), Malaysian Red Crescent
- Response Team (*Pasukan Bertindak Kecemasan*), Kuala Lumpur City Hall
- Rescue team of Fire and Rescue Department Malaysia
- Rescue team of Malaysia Civil Defence Force
- Emergency Medical specialize from Hospital
- Rescue team of the People's Volunteer Corps (RELA)

To measure the content validity, we use the method developed by Lawshe (1975).

It is essentially a method for gauging agreement among raters or judges regarding how essential a particular item is. Each of the subject matter expert raters (SMEs) on the judging panel respond to the question for each item in the questionnaire. Half the panelists indicated that the item is essential checked on questionnaire, which means that items have at least some content validity.

At the same time, we use the formula termed the content validity ratio developed by Lawshe (1975),

$$\text{content validity ratio (CVR)}: \frac{\left(n_e - \frac{N}{2}\right)}{\left(\frac{N}{2}\right)}$$

n_e = number of SME panelists indicating "essential to ask",

This formula yields values which range from +1 to 0.5; the positive values indicate that at least half the SMEs rated the item as essential.

Once the questionnaire has been validated, the questionnaire was pre-tested to examine the reliability and consistent of the information. Pre- testing of the questionnaire is done as a sample of questionnaire is distributed in order to ensure all questions that asked in the questionnaire was understandable by the school children and suitable with the prototype use. Through this, the result is then strengthen. In this context, we used the test-retest reliability, to examine the degree to which the results are consistent over time.

In order to measure the test-retest reliability, we have to give the same test to the same test respondents on two separate occasions. This correlation is known as the test-retest-reliability coefficient. The closer each respondent's scores are on T1 and T2, the more reliable the test measure (and the higher the coefficient of stability will be).

Table 3.6 shows the test-retest reliability of the questionnaire, which was estimated by performing the same set of questionnaire with the same respondents at different times (1-week interval).

Table 3.7: The result of test-retest reliability test

Component test		Test- retest reliability ^a
Section A		1.000
Section B	Sub- section 1:	0.741
	General flood knowledge	
	Sub- section 2:	0.762
	Flood warning	
	Sub- section 3:	0.703
	Assembling flood preparedness kit	
	Sub- section 4:	0.845
	Readiness of response to flood	

Time interval between assessment = 1 week

^a Cohen’s kappa coefficient

- 0.9 and greater: excellent reliability; Between 0.9 and 0.8: good reliability; Between 0.8 and 0.7: acceptable reliability; Between 0.7 and 0.6: questionable reliability; Between 0.6 and 0.5: poor reliability; Less than 0.5: unacceptable reliability.

3.8 Data analysis

All the analysis below were analyzed by using the statistical analysis by performing Statistical Package for Social Science (SPSS) version 22.0 and also Microsoft Excel 2013.

Table 3.8: List of analysis according to specific objectives.

Specific Objectives	Analysis
To develop the prototype of school-based flood preparedness learning model for primary school children at flood prone area in Selangor.	
To determine the flood preparedness knowledge levels among the treatment and control group of the school children before the intervention program.	
To determine the flood preparedness knowledge levels following the intervention program of introducing the prototype flood learning model among the treatment and control group of the school children.	Paired sample T- test
To evaluate the effectiveness of the knowledge transfer of flood preparedness among treatment and control group after the intervention program.	ANCOVA

3.9 Ethical consideration

The permission to conducting this study was obtained from the board of Committee of Ethical, Faculty of Medicine and Health Sciences of University Putra Malaysia. All the personal data and the identity of the respondent of this study will be remained as Private and Confidential and is stated in any parts of the study or publication. The data collection was done after obtaining the approval by the Ethic Board Community, Faculty of Medicine and Health Sciences. (Refer Appendix: Ethic Approval Letter).

CHAPTER 4

RESULTS

4.1 Socio- demographic information of respondents.

A total of 152 respondents were recruited among standard-three school children from five primary schools at Klang, Selangor province. Among the five (5) schools participated in this study, three schools ever experienced flood in their school and two schools never encountered flood. Among the 152 school children, 53.9% of respondents claimed that flood have happened in their school while the rest 46.1% claimed that flood never happened in their school. The socio-demographical background was summarized in Table 4.1. Among the 152 school children, 51.3% are male students and 48.7% are female students. Most (84.2%) of them are Malay, and follow by 15.8% Indian. Besides that, most of the respondents have never experienced flood in their live with total of 52.6% compared to the respondents that have experienced flood with total of 47.4%.

Table 4.1: The socio demographic of the respondents (N= 152)

Student background		n (%)	
		Treatment group	Control group
Gender	Male	44 (53.7)	34 (48.6)
	Female	38 (46.3)	36 (51.4)
Race	Malay	68 (82.9)	60 (85.7)
	Chinese	0 (0)	0 (0)
	Indian	14 (17.1)	10 (14.3)
	Others	0 (0)	0 (0)
Student's experience against flood	Yes	53 (64.6)	19 (27.1)
	No	29 (35.4)	51 (72.9)

4.2 The background knowledge of flood preparedness before the introduction of learning model among treatment group and control group

In this study, 82 school children from school ever experience flood were grouped as treatment group, 70 school children from school never experience flood were grouped as control group.

A pre- test was conducted to examine the basic knowledge level of the school-children as tabulated in Table 4.2. Four sub-elements of flood preparedness knowledge were tested in this study, such as “General Flood Knowledge”, “Flood Warning”, “Assembling Flood Preparedness Kit” and “Readiness of Response to Flood”. Findings shows that both group of school children has the similar knowledge background with regards to flood preparedness. In the General flood knowledge section, the treatment group mean average of total marks was 3.23(0.907) followed by the control group with 3.13(0.815). In addition, for the Flood warning section, the mean average of total marks of treatment group was 15.49(3.140) and 15.37(2.989) mean average of total marks for control group. The mean average of total marks for Assembling flood preparedness kit section was 9.74(2.276) for treatment group and 9.53(3.287) for control group. Whereas, for the Readiness of Response to Flood section, the mean average of total marks was 5.12(0.935) and 4.81(1.277) respectively for treatment and control group. Since there is no significant different of the knowledge on **General flood knowledge, Flood warning, Assembling flood preparedness kit and Readiness of Response to Flood** among control and treatment group before the introduction of learning kit, it is presumed that both group are having the similar knowledge level in terms of flood preparedness.

Table 4.2: The differences of knowledge on flood preparedness before the introduction of learning model among treatment group and control group (N= 152)

Variables	Mean (SD)		Mean difference (95% CI)	p- value *
	Control (n= 70)	Treatment (n= 82)		
General flood knowledge (Total marks=4 marks)	3.13 (0.815)	3.23 (0.907)	0.103 (-0.175, 0.382)	0.465
Flood warning (Total marks=17 marks)	15.37 (2.989)	15.49 (3.140)	0.116 (-0.871, 1.104)	0.816
Assembling flood preparedness kit (Total marks=15 marks)	9.53 (3.287)	9.74(2.276)	0.215 (-0.681, 1.111)	0.636
Readiness of Response to Flood (Total marks=6 marks)	4.81 (1.277)	5.12(0.935)	0.308 (-0.048, 0.663)	0.089
Total scores (total marks= 42 marks)	32.84 (6.081)	33.59 (4.640)	0.743 (-0.978, 2.463)	0.395

**p- value significant at $p \leq 0.05$

4.3 The differences of knowledge on flood preparedness after the introduction of learning model among treatment group and control group.

Post-test was performed after the introduction of learning kit to the treatment group and without the introduction of learning kit to the control group. The mean average of total marks for the control group was considers remain the same and slightly no different from pre- test. Meanwhile, there were differences of knowledge level among the treatment group after the introduction of the learning kit from the pre- test. 3.30(0.812) for the **General flood knowledge section**, 17.60(2.703) for the **Flood warning**, and 12.22(2.228) for the **Assembling flood preparedness kit section** and lastly for the **Readiness of Response to Flood section** was 5.32(1.029). There is significant difference of the overall total score for all sections among control and treatment group after the introduction of learning kit. The information were tabulated in Table 4.3 as shown below.

Table 4.3: The differences of knowledge on flood preparedness after the introduction of learning model among treatment group and control group. (N= 152)

Variables	Mean (SD)		Mean difference (95% CI)	<i>p</i> - value *
	Control (n= 70)	Treatment (n= 82)		
General flood knowledge (Total marks=4 marks)	3.13±0.815	3.30±0.812	0.076 (-0.181, 0.333)	0.558
Flood warning (Total marks=17 marks)	15.37±2.989	17.60±2.703	0.469 (-0.374, 1.312)	0.274
Assembling flood preparedness kit (Total marks=15 marks)	9.53±3.287	12.22±2.228	0.077 (-0.614, 0.768)	0.827
Readiness of Response to Flood (Total marks=6 marks)	4.81±1.277	5.32±1.029	-0.011 (-0.339, 0.316)	0.945
Total scores (total marks= 42 marks)	32.84 (6.081)	38.44 (5.243)	5.596 (3.782, 7.411)	< 0.001*

***p*- value significant at $p \leq 0.05$

4.4 The effectiveness of knowledge transfer of flood preparedness before- After the introduction of learning model among treatment group

Paired t-test was used in this section to compare the different of flood preparedness knowledge following the introduction of flood learning kit. As tabulated in Table 4.4, the knowledge level among the treatment group after the introduction of flood preparedness learning kit were significantly increase at each sub-element. Generally, school children at treatment group showed relatively improve of their flood preparedness knowledge after being introduced with the flood preparedness learning kit. School children showed relatively increase of “General Flood Knowledge” after learning with the flood preparedness learning kit, with the increase of score from 3.23 (0.91) to 3.30 (0.81) of total 4 marks. On the other hand, sub-element of “Flood Warning”, “Assembling Flood Preparedness Kit” and “Readiness of Response to Flood” showed significant increase ($p<0.001$) of knowledge score after learning with the flood preparedness learning kit. For instance, the knowledge of “Flood Warning” score was improved from 15.49 (3.14) to 12.22 (2.23) of total 17 marks, the knowledge of “Assembling Flood Preparedness Kit” was improved from 9.74 (2.23) to 12.22 (2.23) of total 15 marks; as well as the knowledge of “Readiness of Response to Flood” was improved from 5.12 (0.94) to 5.32 (1.03) of total 6 marks. Overall, school children from this treatment group showed significant increase ($p<0.001$) of knowledge level after learning flood preparedness knowledge with the assistance of flood preparedness learning kit, as their total scores increase from 33.59 (4.65) to 38.44 (5.24).

Table 4.4: The effectiveness of knowledge transfer of flood preparedness before- After the introduction of learning model among treatment group (N= 82)

Variables	Mean (SD)		Mean difference (95% CI)	t- value	p- value *
	Before	After			
General flood knowledge (Total marks=4 marks)	3.23 (0.907)	3.30 (0.812)	-0.073 (-0.317, 0.170)	-0.598	0.124
Flood warning (Total marks=17 marks)	15.49 (3.140)	17.60 (2.703)	-2.110 (-2.846, -1.373)	-5.700	≤0.001**
Assembling flood preparedness kit (Total marks=15 marks)	9.74 (2.276)	12.22 (2.228)	-2.476 (-3.012, -1.939)	-9.186	<0.001**
Readiness of Response to Flood (Total marks=6 marks)	5.12 (0.935)	5.32 (1.029)	-0.195 (-0.406, 0.016)	-1.838	<0.001**
Total scores (total marks= 42 marks)	33.59 (4.640)	38.44 (5.243)	-4.854 (-6.005, -3.703)	-8.391	<0.001**

**p- value significant at $p \leq 0.05$

4.5 The effect of educational learning model on the effectiveness of knowledge transfer among the treatment and control group with pre-test as co-variate.

The analysis of covariance (ANCOVA) was used to test the effect of group interaction. This made it possible to control for differences between the participants at the beginning of the experiment. The information were tabulated in Table 4.5 as shown below.

[General Flood Knowledge] There is no significant effect of the educational learning model on introduction of knowledge to the treatment group after the adjustment of the pretesting score, $F(2, 149) = 1.227, p = 0.270 (p \geq 0.05)$. At least 28% of total variance is explained by the introducing of the educational learning model to the treatment group.

[Flood Warning] There is a significant effect of the educational learning model on introduction of knowledge to the treatment group after the adjustment of the pretesting score, $F(2, 149) = 37.901, p < 0.001$. Treatment group significantly have higher mean of flood warning compared to control group. At least 49.9% of total variance is explained by the introducing of the educational learning model to the treatment group

[Assembling Flood Preparedness Kit] There is a significant effect of the educational learning model on introduction of knowledge to the treatment group after the adjustment of the pretesting score, $F(2, 149) = 83.325, p < 0.001$. Treatment group significantly have higher mean of assembling flood preparedness kit compared to

control group. At least 69.4% of total variance is explained by the introducing of the educational learning model to the treatment group.

[Readiness of Response to Flood] There is a significant effect of the educational learning model on introduction of knowledge to the treatment group after the adjustment of the pretesting score, $F(2, 149) = 4.748, p = 0.031 (p \geq 0.05)$. Treatment group significantly have higher mean of readiness of response to flood compared to control group. At least 65.9% of total variance is explained by the introducing of the educational learning model to the treatment group.

[Total score] There is a significant effect of the educational learning model on introduction of knowledge to the treatment group after the adjustment of the pretesting score, $F(2, 149) = 68.531, p < 0.001$. Treatment group significantly have higher mean of total score compared to control group. At least 65.2% of total variance is explained by the introducing of the educational learning model to the treatment group.

Table 4.5: The effect of educational learning model on the effectiveness of knowledge transfer among the treatment and control group with pre-test as co-variate (N= 152)

Factors	Adjusted mean (95% CI)	F- statistics (df)	p-value	R ² value
General Flood Knowledge (Total marks=4 marks)				
Treatment	3.281 (3.130, 3.432)	1.227 (2, 149)	0.270	0.280
Control	3.156 (2.993, 3.320)			
Flood Warning (Total marks=17 marks)				
Treatment	17.565 (17.096, 18.035)	37.901 (2, 149)	<0.001**	0.499
Control	15.409 (14.901, 15918)			
Assembling Flood Preparedness Kit (Total marks=15 marks)				
Treatment	12.142 (11.771, 12.512)	83.325 (2, 149)	<0.001**	0.694
Control	9.620 (9.219, 10.021)			
Readiness of Response to Flood (Total marks=6 marks)				
Treatment	5.199 (5.048, 5.349)	4.748 (2, 149)	0.031**	0.659
Control	4.953 (4.790, 5.116)			
Total Scores (Total marks=42 Marks)				
Treatment	38.166 (37.357, 38.976)	68.531 (2, 149)	<0.001**	0.652
Control	33.162 (32.286, 34.039)			

****p-** value significant at $p \leq 0.05$

CHAPTER 5

DISCUSSIONS

Malaysia has a rapidly-growing economy and evidence suggests that the flood hazard is worsening largely because of rapid urbanization and development. Past studies (Chan and Parker, 1996) showed that flood risk, exposure and damage potential are all increasing which suggest that peoples' vulnerability to floods is not being reduced. Under future climate change, altered patterns of precipitation and sea level rise are expected to increase the frequency and intensity of floods in many regions of the world (Ahern, Kovats, Wilkinson, Few, & Matthies, 2005). Flood risks have become the main disasters concerning most Malaysian in the country.

Malaysians are historically a riverine people as early settlements grew on the banks of the major rivers in the country. The cases of flash flood damaged happened these days are due to the coupled with natural factors such as heavy monsoon rainfall, intense convection rain storms, poor drainage and other local factors, floods have become a common feature in the lives of a significant number of Malaysians (Leigh and Low, 1972).

Flood can severely disrupt livelihoods. Children's safety and health concerns are importantly challenged during floods as in worst scenarios all basic services become disrupted, including water and sanitation conditions, or the provision of community basic health and social services (Haines, Kovats, Campbell-Lendrum, & Corvalan, 2006). In addition, water and sanitation-related communicable disease were recorded to at an increasing rate during or after flooding has the potential to worsen children health condition (Dilley et al.; 2005 Few, 2006).

Other studies (Ahern et al., 2005) also suggest long-term negative effects on the well-being of children aged 9–14 years and 11–20 years, with increases in posttraumatic stress disorder (PTSD), depression, and dissatisfaction with life. Six months after Hurricane Floyd, similar findings were found by Russionello et al. (2002) for children aged 9–12 years. This situation is worsening in the case where the flood happens in the school where the schoolchildren will directly affect by this disastrous situation.

Therefore, flood preparedness is important to ensure the how the children to know what to do, to identify a safe place, and with whom they can be when a disaster like a flood happen in their school. In addition, according to Dorasamy .M (2010) stated that this country is a lack of knowledge based on flood preparedness, which then increasing the vulnerability in case disaster strike. Thus, it is important to this study to be conducted to educate children regarding flood preparedness and along to build a resilient community towards disasters like a flood in Malaysia.

5.1 Socio- demographic information of respondents

School, has been regarded as one of the safest learning building for our future generation. Nevertheless, the safest learning space has changed ever since affecting by flash flood due to its un-strategize location along the river basin. For instance, on 27 January 2017, worsening floods in Terengganu has forced the closure of 27 schools, as the heavy rain during the monsoon season ravaged the east coast of peninsular Malaysia. Many of the schools had been inundated by flood waters, and some roads linking to the schools had been cut off. Schools were challenged to operate normally during and after flood.

In view of this, study conducted among school, which located along the river bank of *Klang* river. Among the five (5) schools selected, three (3) schools have encountered flood in a recent year. This is evident that most of the extensive flood-prone areas are located along the coastal plains and riverine areas which coincide with densely populated and highly built-up areas (Ngai, 1997).

In this study, the fact that only Malay and Indian school children are reported to participate in this study is because of schools located along the river basin are public Malay-stream school systems. Public Chinese-stream school systems are mainly located in the centre of the city (Othman G., 2001) which causes the uneven distribution of multi-races in this context.

All the schools in the area near to river basin were vulnerable to floods. News reported from SinarOnline on 17 October 2015 highlighted that school children attended school along the river basin of *Klang* river also live in the neighborhood of the school. This explained the fact that most school children who participate in this study have either encounter flood from their house or school. This is supported by the report by the Department of Irrigation and Drainage of Selangor in their report on 28 September 2015 which claimed that most of the children living in Klang are at residential areas which are vulnerable to flood hit.

5.2 The background knowledge of flood preparedness before the introduction of learning model among treatment group and control group

Past study (Tuladhar, Yatabe, Dahal, & Bhandary, 2013) stated that the school children have not considered the importance as a tool of the disaster readiness or preparedness for disaster risk reduction. The findings of this study also show that there is no significant different of the basic knowledge among the school children of the treatment and control group on flood preparedness. About two- third of the school children in this study claimed that the knowledge of disaster risk reduction is not really important. This shows that most children are not concerned to the disaster (flood) preparedness. That is why there is no significant difference of flood preparedness basic knowledge among the school children in this study.

Even though Malaysia is one of the member country United Nations Office for Disaster Risk Reduction (UNISDR) to implement the implementation of disaster risk reduction actions by prioritizing the country national strategy, the emphasis has always been more on completing the formal syllabus than the attention given to extra-curricular activities or non-academic related subjects. Thus, learning priority is usually given to topics that are considered more relevant to the exams than disasters and related information

Therefore, it is no surprises that school children among the five (5) schools reported having the same levels of knowledge to flood preparedness. Floods are also blamed for a loss of learning hours as teachers have failed to cover the school syllabus (Mudavanhu et al., 2015). The important of disaster/flood risk reduction learning have not been included in the learning syllabus of the school children in Malaysia. An incomplete education has adversely affected student's response while facing flood risks.

In Malaysia, education and information on disaster are distributed through campaigns on television, radio, posters, brochures and social media. However, this method used and the information conveyed above is regarded as causing the community to respond to flood preparedness passively. In many other countries, disaster education not only involves saving oneself, but includes the capacity of the public to participate in decision-making, in preparedness programs and also the capability to save other people.

In addition to this, Chan (1995) also has shown that existing flood warning systems are largely inadequate and should be upgraded. Often, the flood warnings are issued on an *ad hoc* basis with little co-ordination between the relevant authorities and the local community, as well as school authority is less aware of what to respond next following the flood warning. Inadequate planning and coordination among local authority and institutional agencies have incurred complicated flood response mechanism by the local community.

5.3 The effect of educational learning model on the effectiveness of knowledge transfer among the treatment and control group with pre-test as co-variate

Although children are more vulnerable because of their unique attributes they have the potential to contribute to DRR. Though it would be impossible to protect them from all effects of disasters, involving them would increase their resilience and ability to handle disaster stress. Children have the capacity to communicate effectively on risk and risk reduction to the wider community, but do not fully participate in DRR activities.

The flood preparedness learning kit is designed to supplement formal classroom education. These kits contain materials, manuals, and references to be hands-on to provide a holistic learning to students. The design of this hybrid interactive learning environments are based on the constructivist concept by blending of micro world, supported with elements of both games and imaginary

simulations. The finding of this study showed that there is the significant effectiveness of the knowledge transfer by using flood preparedness learning model. This is consistent with past study which showed that the teaching technique in- class activities (hands-on) were the most effective technique in teaching and for the knowledge transfer (Hackathorn, Solomon, Blankmeyer, Tennial, & Garczynski, 2011). In addition to this, past study also agree that, creating the learning environment to children by letting them “play” (Rieber, L.P., 1996). As the prototype of flood preparedness learning kit introduced in this study, it is designed such that play is a central ingredient in learning, allowing children to imitate preparedness behaviors, practice response skills, process emotional events, and learn much about the flood scenario.

In view of this, classroom teaching is not sufficient if we want the school children to grasp more knowledge, instead, hands-on activities were apparent being enjoyable and more effective in the form of learning in science curriculum (Ateş, Ö and Eryilmaz, A., 2011). Experiential learning or learning by experience is essential for turning knowledge into wisdom for children. It helps a child to absorb more knowledge and ensures that the learning stays in the mind for a longer time. Another crucial benefit of using flood preparedness learning kits is that they make learning, a great fun (Pfeffer and Sutton, 1999). Findings showed in this study also showed that schoolchildren have increased knowledge of recognizing flood warning, assembling flood preparedness kit and have enhanced their readiness of response to the flood.

In other words, classroom learning of flood preparedness and response is believed to be non-attractive one since the school children get bored listening to long classroom lectures, the introduction of flood preparedness learning kits make learning fun and enjoyable. This learning kit makes learning fun and enjoyable. These learning kits are hands-on; children are able to have fun while imagining the flood real scenario in relation to the consequent of responding to this.



CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The finding of the background knowledge on flood preparedness before the introduction of learning kit shows no significant different between both groups of treatment and control. Both groups approximately have the same level of background knowledge on flood preparedness.

The prototype of flood preparedness learning kit divided into four modules, which aims to cover the knowledge on, (i) General Flood Knowledge, (ii) Flood Warning, (iii) Assemble Flood Preparedness Kit, and (iv) Readiness of Response to Flood. Findings of this study shows that, the treatment group has significant increases on knowledge level on module (ii), (iii) and (iv) after active participation and learning with the prototype of flood preparedness learning kit. At the same time, the knowledge level among the control group remains the same as the group is not given the introduction of learning kit on flood preparedness.

In conclusion, the finding of this study shows that the introducing of flood preparedness learning model can help to increase the learning desire and flood preparedness knowledge among the school-children.

6.2 Recommendations

While it is impossible to change the course of natural disasters and epidemics, these interactive flood preparedness learning kits can play an integral role when preparing for a flash flood and help reduce the number of preventable deaths among the school children. This study showed that flood preparedness learning kits are essential for the schoolchild's ultimate learning experience in responding to flood. By mainstream flood risk reduction in the education sector with the aid of this learning kit, it helps to raise the awareness of children, as well as the teachers on the efforts of flood risk reduction.

It believes that the progress should initiate through the introducing of this flood risk reduction learning kit, with the effort to integrate the disaster risk reduction concepts in the school curriculum, and encourage the development of sector-wise as well as school level disaster preparedness plans. It will help the far-reaching impact of raising the awareness of the community as the educated children share their knowledge with the parents at home and also with their children when they become parents (UNESCO, 2010). Mainstreaming efforts, hence, need to highlight the invaluable contribution the children can provide and should look into creating opportunities for them to obtain prominent roles in community-based disaster risk management program.

REFERENCES

- Ahern, M., Kovats, R. S., Wilkinson, P., Few, R., & Matthies, F. (2005). Global health impacts of floods: Epidemiologic evidence. *Epidemiologic Reviews*, 27(May 2017), 36–46. <https://doi.org/10.1093/epirev/mxi004>
- Barredo, J. I. (2007). Major flood disasters in Europe: 1950-2005. *Natural Hazards*, 42(1), 125–148. <https://doi.org/10.1007/s11069-006-9065-2>
- Berz, G., Kron, W., Loster, T., Rauch, E., Schimetschek, J., Schmieder, J., ... Wirtz, A. (2001). World map of natural hazards - a global view of the distribution and intensity of significant exposures. *Natural Hazards*, 23(2–3), 443–465. <https://doi.org/10.1023/A:1011193724026>
- Birkland, T. A. (1997). *After Disaster*.
- Bronstert, A. (2003). Floods and climate change: Interactions and impacts. *Risk Analysis*, 23(3), 545–557. <https://doi.org/10.1111/1539-6924.00335>
- Budde, R, Kautz, K and Kuhlenkamp, K (1992) Prototyping: an approach to evaluationary sytem development. Springer, Berlin
- CEC. (2006). Proposal for a Directive on the assessment and management of floods, Commission of the European Communities, COM (2006)15 final, Brussels 18.01.2006
- Chan, N.W. (1995) “A contextual analysis of flood hazard management in peninsular Malaysia”, unpublished PhD. thesis, Middlesex University.
- Chan, N.W., Parker, D.J. (1996). Response to dynamic flood hazard factors in peninsular Malaysia, *The Geographical Journal*, 162 (3), 313-325.
- Chan, N. W. (2000), ‘Chapter 29 – Reducing Flood Hazard Exposure and Vulnerability in Peninsular Malaysia’, in D J Parker (ed.) *Floods Volume II*. London: Routledge, pp.19 - 30.
- Chan, N. W. (2012). Impacts of disasters and disasters risk management in Malaysia: The case of floods. *Economic and Welfare Impacts of Disasters in East Asia and Policy Responses*. (December), 503–551. <https://doi.org/10.1007/978-4-431-55022-8>
- Chan, N. W. (2015). Increasing Flood Risk in Malaysia : Causes and Solutions, (May 1997). <https://doi.org/10.1108/09653569710164035>
- DID. (2013). Flood Management - Programme and Activities Flood Management - Programme and Activities, (December), 1–4. Retrieved from <http://www.water.gov.my/>
- Dilley M., Chen R.S., Deichmann U., Lerner-Lam A.L., Arnold M., Agwe J., Buys P., Kjevstad O., Lyon B., Yetman G. (2015). *Natural Disaster Hotspots: A Global Risk Analysis*. The World Bank and Columbia University; Washington, DC, USA.

- Dorasamy .M. (2010). Disaster Preparedness in Malaysia: An Exploratory Study. Proceedings of 4th WSEAS Marketing and Management Conference, 19–30. <https://doi.org/1790-2769>
- Ebner, M., & Holzinger, A. (2007). Successful implementation of user-centered game based learning in higher education: An example from civil engineering. *Computers and Education*, 49(3), 873–890. <https://doi.org/10.1016/j.compedu.2005.11.026>
- Flanagan, B. E., Gregory, E. W., Hallisey, E. J., Heitgerd, J. L., & Lewis, B. (2011). A Social Vulnerability Index for Disaster Management. *Journal of Homeland Security and Emergency Management*, 8(1), 1–22. <https://doi.org/10.2202/1547-7355.1792>
- Flood Management - Programme and Activities. (2016, June 02). Retrieved September 25, 2016, from <http://www.water.gov.my/our-services-mainmenu-252/flood-mitigation-mainmenu-323/programme-aamp-activities-mainmenu-199?lang=en>
- Hackathorn, J., Solomon, E. D., Blankmeyer, K. L., Tennial, R. E., & Garczynski, A. M. (2011). Learning by Doing: An Empirical Study of Active Teaching Techniques. *The Journal of Effective Teaching*, 11(2), 40–54.
- Haines, A., Kovats, R. S., Campbell-Lendrum, D., & Corvalan, C. (2006). Climate change and human health: Impacts, vulnerability and public health. *Public Health*, 120(7), 585–596. <https://doi.org/10.1016/j.puhe.2006.01.002>
- How, V., Peter, P. J., Martinus, K. B., Dzahir, N. B. M., Ali, A. I. B., Dzahiruddin, N. D. A. B. A., & Aripin, M. F. B. Z. (2015). A Case Study of Campus-Based Initiatives to Disaster Awareness Program: The Road to Resilience. *OALib*, 2(10), 1–7. <https://doi.org/10.4236/oalib.1101987>
- Isa, S. S. (2001). Classifying Physical Models And Prototypes In The Design Process: 1–12.
- Jabatan Perancangan Bandar dan Desa Negeri Selangor. Laporan Tinjauan. Kajian Rancangan Struktur Negeri Selangor 2035. B11: Saliran.
- Jamaluddin, M. J. (1985). Flash Flood Problems and Human Responses to the Flash Flood Hazard in Kuala Lumpur Area, Peninsular Malaysia. *Akademika*, 26, 45–62.
- Jani, J., Nasir, S. R. M., & Zawawi, N. S. (2015). Isfram 2014, 41–50. <https://doi.org/10.1007/978-981-287-365-1>
- Jeffrey Pfeffer, Robert I. Sutton (1999) Knowing "What" to Do Is Not Enough: Turning Knowledge into Action. *California Management Review*, Vol. 42 No. 1, Fall 1999; (pp. 83-108) DOI: 10.2307/41166020
- Jonkman, S. N. (2005). Global perspectives on loss of human life caused by floods. *Natural Hazards*, 34(2), 151–175. <https://doi.org/10.1007/s11069-004-8891-3>
- Kojima, T. (1991). Models & Prototypes. Clay, Plaster, Styrofoam, Paper. (Chapter 2, p37) Graphic Publishing Co.Ltd. ISBN4766106172.

- Kron, W. (2005). Flood Risk = Hazard • Values • Vulnerability. *Water International*, 30(1), 58–68. <https://doi.org/10.1080/02508060508691837>
- Lawshe, C. (1975). A Quantitative Approach To Content Validity 1. *Personnel Psychology*, (1), 563–575. <https://doi.org/10.1111/j.1744-6570.1975.tb01393.x>
- Loo, Y. Y., Billa, L., & Singh, A. (2015). Effect of climate change on seasonal monsoon in Asia and its impact on the variability of monsoon rainfall in Southeast Asia. *Geoscience Frontiers*, 6(6), 817–823. <https://doi.org/10.1016/j.gsf.2014.02.009>
- Low, K. S., & Leigh, C. H. (1972). An Appraisal of the Flood Situation in West Malaysia. In *Proc. Symposium on Biological Resources and National Development, Kuala Lumpur, Malaysia* (pp. 5-7).
- Lucy Ward (2016). Early year education. Children should learn mainly through play until age of eight. <https://www.theguardian.com/education/2016/mar/15/children-learn-play-age-eight-lego>
- McLeod, S. (2013). SimplyPsychology: Developmental Psychology: Erik Erikson. Retrieved 25 September 2016. <http://www.simplypsychology.org/Erik-Erikson.html>
- Merriam Webster. (2017). Definition of prototype. Retrieved 11 June 2017. <https://www.merriam-webster.com/dictionary/prototype>
- Morrow, B. H. (1999). Identifying and Mapping Community Vulnerability. *Disasters*, 23(1), 1–18. <https://doi.org/10.1111/1467-7717.00102>
- Mudavanhu, C., Manyena, S. B., Collins, A. E., Bongo, P., Mavhura, E., & Manatsa, D. (2015). Taking Children's Voices in Disaster Risk Reduction a Step Forward. *International Journal of Disaster Risk Science*, 6(3), 267–281. <https://doi.org/10.1007/s13753-015-0060-7>
- News (30 March 2012). Klang dilanda banjir kilat lagi. Utusan Online. Retrieved from http://www.utusan.com.my/utusan/info.asp?y=2012&dt=0331&sec=Muka_Hadapan&pg=mh_02.htm
- News (17 October 2015). 'Sebelas kali air masuk rumah'. Sinar Online. Retrieved from <http://www.sinarharian.com.my/edisi/selangor-kl/sebelas-kali-air-masuk-rumah-1.441191>
- News (12 May 2016). Selangor tackling flash floods in 37 'hotspots'. The Star Online. Retrieved from <http://www.thestar.com.my/news/nation/2016/05/12/selangor-tackling-flash-floods-in-37-hotspots/>
- News (5 January 2017). Decades of flood experience and we still can't prevent it. MalaysiaKini. Retrieved from <https://www.malaysiakini.com/columns/368160#ixzz4gS86qy5H>

- Ngai, W. C. (1997). Increasing flood risk in Malaysia: causes and solutions. *Disaster Prevention and Management*, 6(2), 72–86. <https://doi.org/10.1108/09653569710164035>
- Office of Disaster Preparedness and Management. (2013). Hazards: Flooding. Retrieved from <http://www.odpm.gov.tt/node/16>
- Othman, G. (2001). Sekolah berkesan dan program pembaikan sekolah di Malaysia. *Past issues of educators digest*, 1(2), 2001.
- Oxford English Dictionary. (2016). English oxford Living Dictionary: Definition of School children. Retrieved 13 October 2016. <https://en.oxforddictionaries.com/definition/schoolchild>.
- Özlem Ateş, Ali Eryilmaz (2011). Effectiveness of hands-on and minds-on activities on students' achievement and attitudes towards physics. Retrieved from https://www.ied.edu.hk/apfslt/v12_issue1/ates/index.htm
- Perry, C. a. (2000). Significant Floods in the United States during the 20th Century - USGS Measures a Century of Floods. U.S. Geological Survey, Fact Sheet 024–00, March 2000, (March), 4.
- Rahman, H. A. (2009). Global Climate Change and Its Effects on Human Habitat and Environment in Malaysia. *Malaysian Journal of Environmental Management*, 10(2), 17–32.
- Rieber, L.P. (1996). Seriously considering play: Designing interactive learning environments based on the blending of micro worlds, simulations, and games. *Educational Technology Research and Development*, 44(2), 43-58.
- Rosgen, D. L. (2002). *Applied River Morphology*. Second Edition. Wildland Hydrology. Pagosa Springs, Colorado.
- Russoniello CV, Skalko TK, O'Brien K, et al. Childhood posttraumatic stress disorder and efforts to cope after Hurricane Floyd. *bnBehav Med* 2002; 28:61 –70
- Shahirah, A. M. S. (2012). A study on causes of flood at Sungai Isap and Jalan Tun Ismail, Kuantan, Pahang, (June 2012), 24.
- Shaw, R., & Kobayashi, M. (2001). Role of Schools in Creating Earthquake-Safer Environment. *Disaster Management and Educational Facilities*, Disaster M (November), 1–7. <https://doi.org/10.1787/9789264028340-en>
- Sommerville, I. (2011). *Software Engineering. Ninth Edition*.
- Tuladhar, G., Yatabe, R., Dahal, R. K., & Bhandary, N. P. (2013). Knowledge of disaster risk reduction among school students in Nepal. *Geomatics, Natural Hazards and Risk*, 5(3), 190–207. <https://doi.org/10.1080/19475705.2013.809556>
- Ulrich, K.T., and Eppinger, S.D. (2012), *Product and Design Development*, Fifth Edition. McGraw Hill Companies, Inc. ISBN 978-007-108695
- UN Centre for Regional Development (UNCRD). (2009). Reducing vulnerability of school children to earthquakes: A project of school earthquake safety initiative

(SESI), viewed 22 October 2011, from
http://www.preventionweb.net/files/2951_SESIOutcomeallfinal.pdf

UNICEF, & Pigozzi, M. J. (1999). Education in emergencies and for reconstruction: a developmental approach. UNICEF Working Paper Series, 21 p. Retrieved from
[http://www.reliefweb.int/rw/lib.nsf/db900sid/LGEL-5G8FMF/\\$file/unicef-education-1999.pdf](http://www.reliefweb.int/rw/lib.nsf/db900sid/LGEL-5G8FMF/$file/unicef-education-1999.pdf) CN - PIG 74

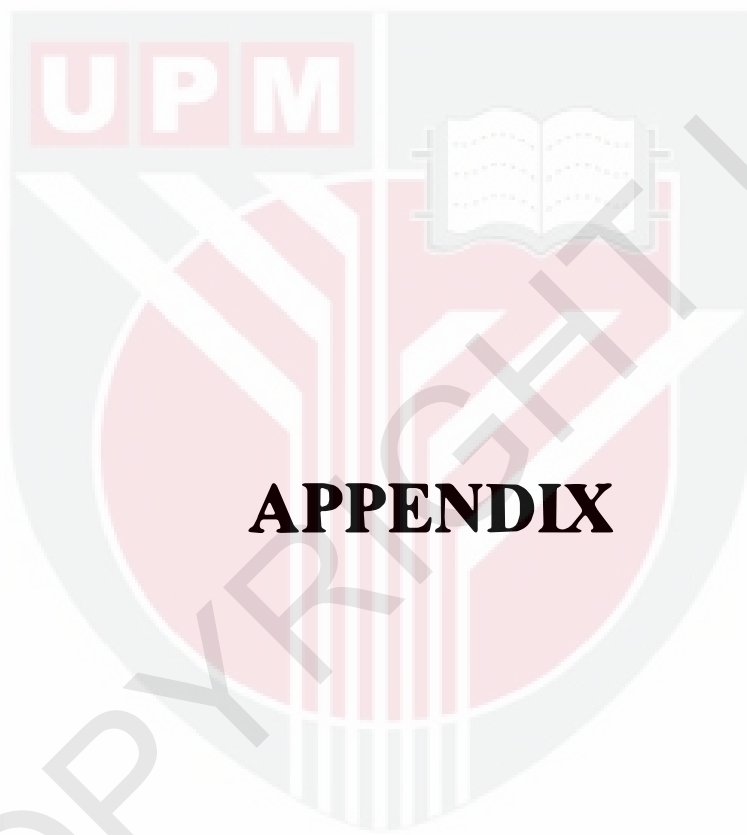
UN Office for Disaster Risk Reduction, 2007, Hyogo Framework for Action 2005–2015. Building the resilience of nations and communities to disasters, ISDR, Geneva, viewed 22 October 2011, from
<http://www.unisdr.org/we/inform/publications/1037>

USGS. (2005). Flood Definitions, U.S. Geological Survey, Kansas Water Science Center, available at:
<http://ks.water.usgs.gov/Kansas/waterwatch/flood/definition.html>

Whitebread, D., & Basilio, M. (2015). Towards a playful pedagogy in Literacy.

World Health Organization (WHO). (2016). Vulnerable groups. Retrieved 30 November 2016.
http://www.who.int/environmental_health_emergencies/vulnerable_groups/en/

Yang, M. C., & Angeles, L. (2005). A study of prototypes, design activity, and design outcome, 26, 649–669. <https://doi.org/10.1016/j.destud.2005.04.005>



APPENDIX

UPM

**ETHICS COMMITTEE FOR RESEARCH INVOLVING HUMAN SUBJECTS
(JKEUPM)
UNIVERSITI PUTRA MALAYSIA**

Research title : **The Effectiveness Of School-Based Flood Preparedness Learning Model Among Primary School Children At Flood Prone Area Of Klang, Selangor**

Study Site : **Klang, Selangor**

JKEUPM Ref No. : **FPSK(EXP16-OSH)U014**

Researcher : **Ezza Sabrina Azmi**

Supervisor : **Dr. Vivien How**

Documents received and reviewed with reference to the above study:

1. Ethics Application Form, Version 1 dated 18/10/2016
2. Respondent Information Sheet & Consent (Malay) Version 2 dated 8/2/2017
3. Respondent Information Sheet & Consent (English) Version 1 dated 8/2/2017
4. Respondent Information Sheet & Guardian's/ Parent Consent (Malay) Version 1 dated 1/12/2016
5. Proposal (English), Version 2 dated 1/12/2016
6. Questionnaire (Malay), Version 2 dated 1/12/2016
7. Questionnaire (English), Version 1 dated 1/12/2016
8. Curriculum Vitae of
a. Dr. Vivien How

The University Research Ethics Committee, Universiti Putra Malaysia (JKEUPM) operates in accordance to the ICH-GCP Guidelines.

Decision by JKEUPM:

☒

Approved

☒

Permission MUST BE OBTAINED from the respective hospitals/ institutions before conducting the research

☐

Disapproved

Please note that the approval is valid until 8 February 2018

Researchers should comply with the following:



FAKULTI PERUBATAN DAN SAINS KESIHATAN
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UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG,
SELANGOR, MALAYSIA

RESPONDENT INFORMATION SHEET

Please read the following information carefully. Do not hesitate to discuss any questions you may have with the researcher.

1. STUDY TITLE

The Effectiveness Of School-Based Flood Preparedness Learning Model Among Primary School Children At Flood Prone Area Of Selangor

2. INTRODUCTION

School is an institution that is effective to build a culture of students and the community to prepare for a flood. School-Based Flood Preparedness Learning Model were developed to enhance knowledge and skills of students to ensure that they need to protect and maintain the health and safety of themselves during the flood. Thus, the objective of this study is to examine the effectiveness of School-based flood preparedness Learning Model among students about preparation when disaster.

3. WHAT WILL YOU HAVE TO DO ?

Your son/ daughter/ ward will be interview and required to answer a questionnaire and following a series of tests that will be conducted by researchers. Your son/ daughter/ ward must obtain the consent of parents / guardians to sign a consent form (respondent) to indicate their importance in engaging in this study. Your son/ daughter/ ward need to return the consent form to the researcher.

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY ?

Subjects who do not meet the inclusive criteria of this study should not enter this study. The inclusive criteria of this study are those students that present during the study being conducted. The students that are on leave during data collection will be excluded from the study.



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SELANGOR, MALAYSIA

5. WHAT WILL BE THE BENEFITS OF THE STUDY :

(a) TO THE STUDENT

The results of this study will be used to enhance the knowledge of the students on the preparation and supply themselves when faced with floods, and also their safety and health during flooding. In addition, with this 'School-Based Flood Preparedness Learning Model' will practicing the transfer of knowledge among the public and school children. This is to achieve the best results possible and can be implemented to promote community resilience and promote a country that is able to withstand any future disaster with sustainable development. At the end of the study, participants will get a consolation prize as a token of appreciation of our party to have contributed their time and energy during this study and was conducted.

(b) TO THE INVESTIGATOR

This study may help researchers to determine the level of knowledge of students related to flood preparedness before and after the introduction of School-Based Flood Preparedness Learning Model among primary school children at flood prone area of Selangor

6. WHAT ARE THE POSSIBLE RISKS ?

This study will not involve any risk of accident, infections, injury and so on. All the research process will be conducted in a safe area. Tests will also be carried out in accordance with regulations and law that have been set.

7. WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL ?

All the informations gathered from your son/ daughter/ ward will be treated very confidentially and will be known by researcher study. No individual information from any aspect will be discuss.

8. WHO SHOULD YOU CONTACT IF YOU HAVE ADDITIONAL QUESTIONS DURING THE COURSE OF THE RESEARCH ?

Any problems or questions about this study can be directed to the following officers either meet in person or by phone:

Project leader: Dr. Vivien How

Contact no: 016-6193697; Email: vivienhw1022@gmail.com; Office address: Department of Environmental and Occupational Health, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400, Selangor.

Researcher: Ezza Sabrina Binti Azmi

Contact no: 012- 8299309; Email: sabrina.ezza@yahoo.com; Office address: Department of Environmental and Occupational Health, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400, Selangor.



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CONSENT FORM (PARENT / GUARDIAN)

STUDY TITLE :

The Effectiveness Of School-Based Flood Preparedness Learning Model Among Primary School Children At Flood Prone Area Of Selangor

RESEARCHER :

I Identity card No.
address
agree to *(allow / not allow) my son/ daughter/ ward
..... to participate in the research as stated
above.

I have been informed about the nature of the research in terms of methodology, complications and possible adverse effects (as written in the Respondent Information sheet). I understand that my son/ daughter/ ward has the right to withdraw from this research at any time without giving any reason whatsoever. I also understand that this study is confidential and all information provided with regard to the identity of my son/ daughter/ ward will remain private and confidential.

*Delete where necessary

Signature
(Parent/ guardian)

Signature
(Witness)

Name:

Date:

I/C No:

I confirm that I have explained to the respondent's parent/ guardian the nature and the purpose of the above mentioned research.

Date:

Signature:
(Researcher)



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LAMPIRAN MAKLUMAT RESPONDEN

Sila baca maklumat berikut dengan teliti, sila bertanya untuk membincangkan apa – apa persoalan anda dengan penyelidik anda.

1. TAJUK KAJIAN

Keberkesanan Model Kesianaan Banjir Berasaskan Pembelajaran Sekolah dalam kalangan kanak-kanak sekolah rendah di kawasan mudah banjir di Klang, Selangor.

2. PENGENALAN

Melihat bahawa sekolah merupakan sebuah institusi yang berkesan untuk membina budaya pelajar dan masyarakat kini dalam mempersiapkan diri menghadapi bencana banjir. Model Kesianaan Banjir Berasaskan Pembelajaran Sekolah dibangunkan untuk menambahkan pengetahuan dan kemahiran pelajar untuk memastikan bahawa mereka perlu melindungi dan menjaga keselamatan dan kesihatan diri mereka semasa bencana banjir. Justeru, objektif kajian ini adalah untuk mengkaji keberkesanan Model Kesianaan Banjir berasaskan pembelajaran sekolah dalam kalangan pelajar mengenai persediaan ketika bencana banjir.

3. APA YANG ANDA AKAN LAKUKAN ?

Anak anda / anak di bawah jagaan anda akan ditemuduga dan dikehendaki menjawab soal selidik serta mengikuti beberapa siri ujian yang akan dijalankan oleh penyelidik. Anak anda / anak di bawah jagaan anda perlu mendapatkan persetujuan ibu bapa / penjaga mereka bagi menandatangani borang persetujuan (responden) untuk menunjukkan kepentingan mereka dalam melibatkan diri dalam kajian ini. Setelah itu, anak anda / anak jagaan anda perlu mengembalikan borang keizinan ini kepada penyelidik.

4. SIAPA YANG TIDAK PERLU MENGAMBIL BAHAGIAN DALAM KAJIAN INI ?

Subjek yang tidak memenuhi kriteria inklusif kajian ini tidak harus menjalani kajian ini. Kriteria inklusif kajian ini adalah pelajar-pelajar yang hadir dalam kajian eksperimen dijalankan. Pelajar yang tidak hadir semasa pengumpulan data akan dikecualikan daripada kajian.



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5. FAEDAH KAJIAN :

(a) KEPADA PELAJAR

Keputusan kajian ini akan digunakan untuk meningkatkan pengetahuan pelajar terhadap persiapan dan persediaan diri ketika menghadapi bencana banjir, keselamatan dan kesihatan mereka semasa berlakunya banjir. Selain itu, dengan adanya Model Kesediaan Banjir Berasaskan Pembelajaran Sekolah ini adalah dengan melakukan amalan pemindahan pengetahuan di kalangan masyarakat dan kanak-kanak sekolah. Ini adalah untuk mencapai hasil yang paling mungkin dan boleh dilaksanakan untuk menggalakkan masyarakat yang berdaya tahan dan memupuk sebuah negara yang mampu menahan apa-apa bencana banjir akan datang dengan pembangunan mampan. Di akhir kajian ini, peserta akan mendapat hadiah saguhati sebagai tanda penghargaan dari pihak kami kerana telah menyumbang tenaga dan masa semasa kajian ini dtelah dijalankan.

(b) PENYELIDIK

Kajian ini dapat membantu penyelidik untuk menentukan tahap pengetahuan pelajar mengenai persediaan banjir sebelum dan selepas pengenalan Model Kesediaan Banjir Berasaskan Pembelajaran Sekolah bagi pelajar sekolah rendah di sekitar kawasan yang terdedah kepada banjir di Selangor.

6. ADAKAH TERDAPAT SEBARANG RISIKO ?

Kajian ini tidak akan melibatkan sebarang risiko kemalangan, jangkitan, kecederaan dan sebagainya. Semua proses penyelidikan akan dijalankan di kawasan yang selamat. Ujian juga akan dijalankan mengikut peraturan dan undang –undang yang telah ditetapkan.

7. ADAKAH MAKLUMAT DAN IDENTITI SAYA AKAN KEKAL SULIT ?

Semua maklumat mengenai responden telah dijamin rahsia dan sulit. Tiada maklumat individu dari aspek yang akan dibincangkan.

8. SIAPA YANG PERLU DIHUBUNGI JIKA ADA PERMASALAHAN ATAU PERSOALAN TAMBAHAN SEMASA PROSES PENYELIDIKAN ?

Sebarang permasalahan atau persoalan mengenai kajian ini boleh diajukan kepada pengawai berikut sama ada berjumpa secara langsung atau melalui telefon bimbit:

Ketua Projek: Dr. Vivien How

No. telefon: 016-6193697; Email: vivienhw1022@gmail.com; Alamat pejabat: Jabatan Kesihatan Persekitaran dan Pekerjaan, Fakulti Perubatan dan Sains Kesihatan, Universiti Putra Malaysia, 43400, Selangor.

Penyelidik: Ezza Sabrina Binti Azmi

No. telefon: 012- 8299309; Email: sabrina.ezza@yahoo.com; Alamat pejabat: Jabatan Kesihatan Persekitaran dan Pekerjaan, Fakulti Perubatan dan Sains Kesihatan, Universiti Putra Malaysia, 43400, Selangor.



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SELANGOR, MALAYSIA

BORANG PERSETUJUAN PENYERTAAN (IBU BAPA/PENJAGA)

TAJUK KAJIAN :

Keberkesanan Model Kesediaan Banjir Berasaskan Pembelajaran Sekolah dalam kalangan kanak-kanak sekolah rendah di kawasan mudah banjir di negeri Selangor.

PENYELIDIK

Saya No. Kad Pengenalan
beralamat
bersetuju *(membenarkan / tidak membenarkan) anak / jagaan saya
..... menyertai pengajian soal selidik seperti
yang disebut di atas.

Saya telah diberi penjelasan secara menyeluruh mengenai dasar penyelidikan secara menyeluruh mengenai pengajian soal selidik dari segi metodologi, komplikasi dan kesan buruk (rujuk kepada Lampiran Maklumat Responden). Saya memahami bahawa anak / jagaan saya berhak menarik diri dari pengajian soal selidik ini pada bila – bila masa tanpa memberi sebarang alasan. Saya juga memahami bahawa sebarang maklumat yang berkaitan identiti anak / jagaan saya akan dirahsiakan.

**Potong yang mana tidak berkenaan*

Tandatangan Tandatangan
(Ibu Bapa / Penjaga) (Saksi)

Nama : Tarikh :
No I/C :

Saya mengesahkan bahawa saya telah menerangkan kepada Ibu Bapa / Penjaga mengenai ciri-ciri dan tujuan pengajian soal selidik seperti yang dinyatakan di atas.

Tarikh : Tandatangan :
(Penyelidik)



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SELANGOR, MALAYSIA

BORANG PERSETUJUAN PENYERTAAN (IBU BAPA/PENJAGA)

TAJUK KAJIAN :

Keberkesanan Model Kesediaan Banjir Berasaskan Pembelajaran Sekolah dalam kalangan kanak-kanak sekolah rendah di kawasan mudah banjir di negeri Selangor.

PENYELIDIK :

Saya No. Kad Pengenalan
beralamat
bersetuju *(membenarkan / tidak membenarkan) anak / jagaan saya
..... menyertai pengajian soal selidik seperti
yang disebut di atas.

Saya telah diberi penjelasan secara menyeluruh mengenai dasar penyelidikan secara menyeluruh mengenai pengajian soal selidik dari segi metodologi, komplikasi dan kesan buruk (rujuk kepada Lampiran Maklumat Responden). Saya memahami bahawa anak / jagaan saya berhak menarik diri dari pengajian soal selidik ini pada bila – bila masa tanpa memberi sebarang alasan. Saya juga memahami bahawa sebarang maklumat yang berkaitan identiti anak / jagaan saya akan dirahsiakan.

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(Ibu Bapa / Penjaga) (Saksi)

Nama : Tarikh :
No I/C :

Saya mengesahkan bahawa saya telah menerangkan kepada Ibu Bapa / Penjaga mengenai ciri-ciri dan tujuan pengajian soal selidik seperti yang dinyatakan di atas.

Tarikh : Tandatangan :
(Penyelidik)

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ENVIRONMENTAL AND OCCUPATIONAL HEALTH DEPARTMENT
FACULTY OF MEDICINE AND HEALTH SCIENCES
UNIVERSITI PUTRA MALAYSIA

THE EFFECTIVENESS OF SCHOOL-BASED FLOOD PREPAREDNESS
LEARNING MODEL AMONG PRIMARY SCHOOL CHILDREN AT FLOOD
PRONE AREA OF KLANG, SELANGOR

INSTRUCTIONS:

1. This questionnaire is in dual language. Please answer either **Malay** or **English** only.
2. This questionnaire consist of two (2) sections:
Section A: Personal detail
Section B: Knowledge level related to flood
Sub- section 1: “General flood knowledge”
Sub- section 2: “Flood warning”
Sub- section 3: “Assembling flood preparedness kit”
Sub- section 4: “Readiness of response to flood ”
3. You are required to answer all the questions given.
4. Tick (√) in the space given to answer the questions.
5. This questionnaire need to be submit to the researcher after finish answering all the questions.

SECTION A: PERSONAL DETAILS

Please tick (☒) in the space given to answer the question.

For example:

☒

1. Name: _____.

2. Age :

--

 9 years old

3. Gender :

 Male
Female

4. Race :

 Malay
Chinese
Indian
Others (Please state): _____

5. Have you experienced flood?

 Yes
No

SECTION B: KNOWLEDGE LEVEL RELATED TO FLOOD

Please tick (√) in the space given to answer the question.

For example:

√

SUB- SECTION 1: “General flood knowledge”

- 1. Happens during heavy rains, when rivers overflow or when dams or levees break.
- 2. Flood is a natural disaster that not dangerous to the community.
- 3. Flood can damage bridges, roads and other transport links.
- 4. If flood happen, we might be left without power supply or clean drinking water which can lead to outbreaks of diseases.

True	False

SUB- SECTION 2: “Flood warning”

- 1. We have to stay away from flooded areas. Even if it seems safe, flood water may still be rising.
- 2. Never try to walk, swim or play in flood water.
- 3. We are not be able to see on the surface due to fast flood water is moving or see holes and submerged debris.
- 4. Never play around high water, storm drains, ditches, ravines or culverts. It is easy to be swept away by fast moving water.
- 5. Throw away all food that has come into contact with flood waters.

True	False

6. Eating foods exposed to flood water can make you very sick, this is because the food may contaminated with bacteria and germs.
7. Shut down the electricity to avoid electrical shock during flood.
8. Identify sources of water that clean and can be consumed during floods:



Well water ☐



Puddle ☐



Water bottle ☐



River ☐



Flood water ☐

9. Identify the signs and symptoms as a result of diseases happen because of floods (e.g: cholera, dengue, malaria, etc):

1. Vomiting
2. Diarrhea
3. High fever
4. Fresh body
5. Headache

True False

6. Shivering
7. Stomach ache
8. Loss of appetite

SUB- SECTION 3: “Assembling flood preparedness kit”

- 1. Keep items in airtight plastic bags. This will help to protect them from damage or spoiling.**
- 2. Keeping a smaller flood emergency kit in the classroom or at home.**

3. Among the items below, please select the items that need to be provided in the "flood emergency kit"

1. Can opener
2. 3- day supply of non- perishable food
3. First aid kit
4. Sleeping bag or warm blanket for everyone in your family
5. Clothes for 3- day
6. Tooth brush, toothpaste and soap
7. Paper plates, paper cups and paper towel
8. Drinking water- at least a gallon per person, per day
9. Flashlight with extra batteries
10. Cell phone with charger
11. Rain coat
12. Whistle

SUB- SECTION 4: “Readiness of response to flood”

- 1. ‘Hero’ will climb up to the higher spot during flood.
- 2. During the floods, ‘Hero’ will run outside of disaster and find a safe place.
- 3. ‘Hero’ will bring their flood emergency kit together.
- 4. ‘Hero’ always carries a list of emergency phone numbers together.
- 5. ‘Hero’ will help friends during the floods, and them to become a ‘Hero’
- 6. ‘Hero’ will ensure their friends in a safe condition during flood by telling them the danger during floods.

True	False



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**JABATAN KESIHATAN PERSEKITARAN DAN PEKERJAAN
FAKULTI PERUBATAN DAN SAINS KESIHATAN
UNIVERSITI PUTRA MALAYSIA**

**KEBERKESANAN MODEL KESEDIAAN BANJIR BERASASKAN
PEMBELAJARAN SEKOLAH DALAM KALANGAN KANAK-KANAK SEKOLAH
RENDAH DI KAWASAN MUDAH BANJIR DI KLANG, SELANGOR.**

ARAHAN SOALAN :

1. Borang soal selidik ini dalam dua Bahasa. Sila jawab sama ada **Bahasa Melayu** atau **Bahasa Inggeris** sahaja.
2. Borang soal selidik ini mengandungi dua (2) bahagian iaitu :
Bahagian A : Maklumat diri
Bahagian B : Tahap pengetahuan mengenai banjir
Seksyen 1 : “Pengetahuan Am banjir”
Seksyen 2 : “Amaran ketika banjir”
Seksyen 3 : “Kit kecemasan banjir”
Seksyen 4 : “Kesediaan tindak balas kepada banjir”
3. Anda diminta menjawab semua soalan yang disediakan.
4. Untuk menjawab, anda perlulah menandakan (✓) pada ruangan kotak yang disediakan.
5. Borang soal selidik ini hendaklah diserahkan semula kepada pengkaji setelah selesai menjawab semua soalan.

BAHAGIAN A: MAKLUMAT DIRI

Untuk menjawab, anda perlu menandakan (√) pada ruang kotak yang disediakan.

Contoh adalah seperti berikut:

√

1. Nama :

2. Umur : 9 Tahun

3. Jantina :
Lelaki
Perempuan

4. Bangsa :
Melayu
Cina
India
Lain- lain (nyatakan): _____

5. Pernahkah anda mengalami situasi banjir ?
Ya
Tidak

BAHAGIAN B: TAHAP PENGETAHUAN MENGENAI BANJIR

Untuk menjawab, anda perlu menandakan (√) pada ruang kotak yang disediakan.

Contoh adalah seperti berikut :

√

SEKSYEN 1: “Pengetahuan Am banjir”

- 1. Banjir berlaku semasa hujan lebat, apabila sungai melimpah ataupun apabila empangan pecah.
- 2. Banjir adalah bencana alam yang tidak berbahaya kepada masyarakat.
- 3. Banjir boleh merosakkan jambatan, jalan raya dan jalan-jalan untuk pengangkutan yang lain.
- 4. Jika banjir berlaku, kita mungkin ditinggalkan tanpa air minuman yang bersih yang boleh membawa kepada wabak penyakit.

Betul	Salah

SEKSYEN 2: “Amaran Ketika Banjir”

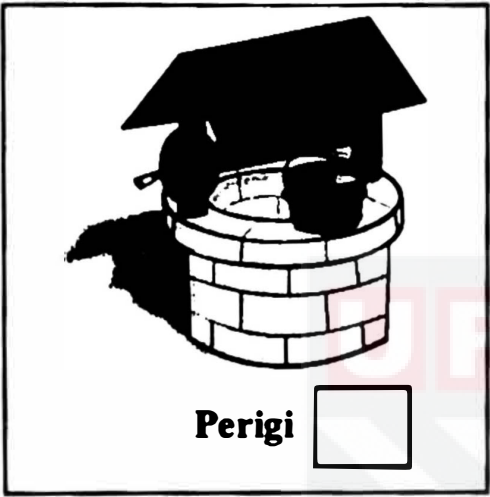
- 1. Kita haruslah menjauhkan diri dari kawasan banjir. Walaupun ia seolah-olah selamat, air banjir masih boleh meningkat.
- 2. Jangan cuba untuk berjalan, berenang ataupun bermain di dalam air banjir.
- 3. Kita tidak dapat melihat melalui permukaan air banjir jika terdapat lubang dan serpihan yang tenggelam.
- 4. Jangan bermain air berhampiran longkang, parit atau pembetung kerana kita boleh dihanyutkan oleh air yang deras.
- 5. Kita hendaklah membuang semua makanan yang terkena air banjir.

Betul	Salah

6. Makanan yang terkena air banjir akan tercemar dan akan menyebabkan kita sakit.

7. Kita haruslah menutup elektrik untuk elak terkena kejutan elektrik

8. Kenalpasti sumber air yang bersih dan boleh diminum semasa banjir:



9. Kenali tanda-tanda dan gejala-gejala akibat daripada penyakit yang dihidapi akibat daripada banjir (contoh: Kolera, denggi, malaria, dsb):

1. Muntah- muntah

2. Cirit- birit

3. Demam panas

4. Tubuh badan segar

5. Sakit kepala

Betul	Salah

6. Badan mengigil
7. Sakit perut
8. Kurang selera makan

SEKSYEN 3: “Kit kecemasan banjir”

1. Beg plastik kedap udara digunakan untuk menyimpan barang- barang kecemasan supaya tidak rusak.
2. Di kelas dan juga di rumah haruslah ada “kit kecemasan banjir”

Betul	Salah

3. Antara barang- barang di bawah, sila pilih barang- barang apa perlu tersedia dalam “kit kecemasan banjir”

1. Pembuka tin
2. Bekalan makanan yang tidak mudah rosak selama 3 hari
3. Peti pertolongan cemas
4. Beg tidur ataupun selimut untuk setiap ahli keluarga
5. Pakaian untuk 3 hari
6. Berus gigi, ubat gigi dan sabun mandi
7. Pinggan dan cawan kertas, kertas tisu
8. Air minuman
9. Lampu picit bersama bateri tambahan
10. Telefon bimbit bersama pengecas
11. Baju hujan
12. Wisel

[illegible]

SEKSYEN 4: “Kesediaan tindak balas kepada banjir”

	Betul	Salah
1. Semasa banjir seorang ‘Hero’ akan memastikan dia mendaki tempat yang lebih tinggi.		
2. Semasa banjir ‘Hero’ akan memastikan dia lari keluar daripada tempat bencana dan mencari tempat selamat.		
3. ‘Hero’ akan membawa ‘Beg kecemasan banjir’ bersama- sama.		
4. ‘Hero’ sentiasa membawa senarai nombor telefon kecemasan bersamanya.		
5. ‘Hero’ akan menolong rakan- rakan semasa banjir dan membantu rakan- rakan lain menjadi ‘Hero’.		
6. ‘Hero’ akan memastikan rakan- rakan mereka dalam keadaan yang selamat semasa banjir dengan memberitahu mereka bahaya semasa banjir.		