THE DELIVERY OF ENVIRONMENTAL HEALTH SERVICES IN MALAYSIA

MAEH Journal of Environmental Health eISS
Jurnal Kesihatan Persekitaran MAEH
Published By Malaysian Association of Environmental Health
http://www.maeh4u.org.my/journal

Challenges in Crisis Management on Environmental Health Deliveries in Malaysia

Shahmiza Salleh[a], Nazattulsyima Misri[a], Ili Nuryumni Saufian[a], Nurfazhilah Abdul Razak[a], Mohamad Faizal Ishak[a], Farah Ayuni Shafie[a,f*], Megat Azman Megat Mokhtar[a], Juliana Jalaludin[b], Farahdilla Abu Bakar[c], Masniza Mustaffa[d], Peter Gan Kim Soon[d], Sahhir Kunju[e]

[a] *Centre of Environmental Health and Safety, Faculty of Health Sciences, Universiti Teknologi MARA Puncak Alam, Selangor, Malaysia*
[b] *Department of Environmental and Occupational Health, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, Selangor*
[c] *Kementerian Kesihatan Malaysia Wilayah Persekutuan Putrajaya*
[d] *MERCY Malaysia, Kuala Lumpur*
[e] *Solid Waste and Public Cleansing Management Corporation (SWCorp)*
[f] *Malaysian Association of Environmental Health*

**Corresponding author: farahayuni@uitm.edu.my*

INTRODUCTION

Malaysia's environmental health problems are primarily caused by air and water pollution, climate change, the depletion of ozone and solid waste management. Other than that, the management of toxic, chemical and hazardous waste are other factors which can cause environmental health problems. The Ministry of Health of Malaysia has aggressively promoted the agenda for environmental protection to the district, state, regional and international agencies. This article will address environmental health problems and the crisis management system including the challenges faced in Malaysia. There are three cases addressed in this article which are floods in Malaysia, transboundary haze in ASEAN region and pandemic Covid-19. Monsoon flood commonly happens at the East Coast of Peninsular Malaysia hence has an instant effect to the community Malaysia faced flood disaster in 1926, 1967 and 1971. The flood destroyed the property, road networks, property and crops. The Kelantan flood in December 2014 is, however, the worst in modern history. The flood affected nearly 150,000 victims and set new records in Malaysian history for most flood victims.

The trans boundary haze is air pollution that affected nation-wide and focuses on countries in South East Asia such as Indonesia, Malaysia and Singapore. This event occurred when forest fires were being illegally set off. The ashes and dust are from "slash and burn" practice to clear off land for preparation of replantation. As in Malaysia, the monsoon wind season from the southwest and for agricultural plantations in the neighbouring country was blown to Malaysia and causes air pollution. The transboundary haze contains burnt ash, dust and smoke particles, which affects the health of the population mainly to children, elderly and patients with past medical problems. Chances of developing breathing difficulties are higher due to low air quality during transboundary haze.

Apart from floods and transboundary haze, Malaysia is also facing global challenges. Pandemic coronavirus (COVID-19) gives a great impact worldwide, not recognizing nationalities and restrictions. When COVID-19 pandemic continually evolves worldwide, reporting of clinical outcomes and risk factors for intensive care unit admission and mortality are developing. The pandemic COVID-19 impact not only is restricted to the health status of all but also to the government of all countries, economy specialist, health behaviours and social behaviours. The pandemic makes an individual struggle to survive, teaches us to go yonder and build up to survive through improvement and innovation. The survival through the crisis makes the community more adaptable to the pandemic challenge even the pause phase for earth from activities by human that disrupt the ecosystems has permitted nature to self-heal, severe drop in air pollution, cleaner water sources and wild inhabitants back to their spaces.

CRISIS MANAGEMENT AND CHALLENGES

Environmental health practices are also known to be multidisciplinary including engineering, health sciences, chemistry, and biology, along with a number of arid information sciences for financial and management. People from many backgrounds participate in programs intended to track, restore and preserve public health within disaster and recovery limes. Likewise, health workers find themselves partnering with others to assist with non-health-related work, such as search and rescue, or health-related work, such as public education.

The crisis management comes with its own challenges. The crisis consists of three stages which is Pre-crisis, During-crisis and Post-crisis to ensure all stages can be manage accordingly (Yusoff et al, 2018). Disasters are incidents in which a large number of people are subjected to catastrophic events. For example, flood caused injury or illness combined with possible property and livelihood damage. During a natural disaster or other emergency, Environmental Health system provides essential services for protecting and ensuring the

well-being of the people in affected areas, with an emphasis on prevention and control of disease and injury. The priorities include:

1. Ensuring an adequate supply of safe drinking water.
2. Providing food protection measures.
3. Ensuring basic sanitation services.
4. Promoting personal hygiene.
5. Assisting the efforts of first responders by providing health risk consultations or advising on exposure pathways.
6. Providing information to emergency managers to help assess the scale of the emergency to ensure an effective response.

Environmental Health Officer (EHO) plays an important role during crisis management stages. The function of EHO during preparation of crisis management is to prevent disease outbreak and victims' safety (Whiley et al., 2019). When an unexpected crisis occurs, the challenges faced by EHO are revealed. The challenges were clearly seen during the trans-boundary haze and the Covid-19 pandemic. Therefore, Environmental Health (EH) Risk Modelling Prediction should be organized by a multi-sectoral EH expert. The World Health Organization (2012) stated that a good public health outcome for individuals and communities comes from a strong basis of environmental health discipline.Flood causes power failures, broken pipes and blocked roads. It can interrupt water, waste and food-handling services for hours or even a few days. More severe damage to civil engineering infrastructure can cause disturbances that last days or weeks, from bridges to water sources. Contingency plans are required for temporary repairs and alternative sources of water and sanitation, where appropriate. Inefficient and improper response towards the unexpected events will lead to failure of the disaster management system. Different backgrounds of communities always look for different ways in managing the damages of the unexpected events. Therefore, disaster management needs to be prepared to encounter the crisis in order to benefit public health and the environment.

The role of EHO during crisis is to identify suitable evacuation centre with supply of clean drinking water and enough food besides water for personal hygiene and waste management. EHO in flood management also involves in relief operation and organizing funding and aid delivery. The problem during disaster relief operations will vary which includes various factors such as the location, type, impact of the disaster and local conditions of the affected regions. When the victims have already moved to evacuation centres provided by the government, they will expect government assistance in reducing the misery and the burden. The victims were not comfortable with the system implemented by Department of Social Welfare (JKM), the Malaysian National Security Council (NSC) and the District Office due to lack of rescue equipment and unpleasant evacuation centres (Said et al., 2013). In that case, the government should take the complaint and the perceptions of the victims as a guide for better distribution of aid operations in the future. Other than flood, another problem faced by Malaysia and other ASEAN countries which raised a question on legal action that was imposed on Indonesia for causing the transboundary haze pollution. According to the Sarok & Nizam, (2019), it is impossible for Malaysia to breach the nature of international law or the sovereignty of another country unless that country waives its sovereign immunity willingly. Lack of expertise in Malaysia to tackle the transboundary haze by creating the bridge between the Environmental Health practitioners from all the ASEAN countries that would help in sharing knowledge and making control measures to reduce the impact of transboundary haze.

When pandemic disaster comes in such as COVID-19, local governments, mayors and communities must be engaged and should share their challenges and successes with each other and with regional and national authorities. There need to be new forms of collaboration between urban health experts, governments agencies at all levels, sanitation experts, social scientists, innovators and urban planners. Different countries have a different approach to combat COVID-19. Here are three ways that countries take up to contain the spread of the disease.

i) Restricting International and Local Access

Many countries opted for serious measures as an immediate effect to prevent the transmission of disease and to slow down the death toll from this pandemic. In Malaysia, international borders closed indefinitely with some exceptions to comply with certain immigration rules. Agencies such as Malaysia Airports are working closely with governments such as the Ministry of Health (MOH), Immigration Department of Malaysia IMI) and Ministry of Foreign Affairs Malaysia to screen international passengers. Some of the measures taken by the MOH are thermal screening for arriving passengers and flight crews and allocate special medical bays for quarantine purposes to cater any passengers with virus symptoms. Passengers without symptoms are compulsory to self-quarantine for 14 days upon arrival. Challenges faced by EHO and AEHO during screening is communication / language barrier from international visitors, some passengers did not give good cooperation even tend to lie about their history and contact details. Therefore, proper measures taken cannot be performed in order to prevent communicable disease.

When there is a possibility of high-risk local infection, local authorities will work closely with the government to make the area gazetted as Temporary Extended Movement Control Order (EMCO / TEMCO) Area. The challenge throughout this period is to make sure people in the TEMCO area do not leave that area, trace back the high risk close contact, supply food and daily necessity. Cost and human resources are crucial during this period.

ii) Revitalizing Public Transit Systems

In order to reduce contact with drivers, many operators now forbid passengers from boarding through the front door. They also stopped selling tickets on-board. Meanwhile in Switzerland some buses separated drivers with temporary barricades from passengers. Bus operators in both Europe and China started using floor markings to signify a safe gap between riders.

iii) Providing Radical Data Transparency

Daegu, South Korea has implemented a strategy of public participation and open data. This has provoked some criticism but also led to novel response. Residents of South Korea have been asked to use self-diagnostic apps that connect them to medical staff. Their government also has launched a series of websites and apps that share more information on disease spread. Their students created an interactive map that shows locations that have been visited by infected people and their demographic characteristics. These apps can also give warnings when a person enters within 100 meters of those affected locations. Goyang City has implemented drive through testing, whereby people can simply lower their car windows and get swabbed by medical personnel with full protective attire. However, challenges faced by EHO and AEHO is when there is a certain type of people, they do not follow the control measure that have been implemented by NSC such as 3W (Wash, Wear & Warn), avoiding of 3S (Crowded Place, Confined Space & Close Conversation). This new norm should be followed by all Malaysian people in order to control the spreading of Covid-19. Besides that, Malaysia Government had introduced the "MySejahtera" apps which will help the individuals knowing the status of COVID-19 at their place or place they visited. Ignoring on the COVID-19 pandemic safety operating procedure provided by the government will lead to the increment of new positive cases. Other positive uses of MySejahtera is its applicable not only for COVID-19 field investigation / control measures but also to other disease or event. For example, during food poisoning event in a restaurant, EHO / AEHO can use "MySejahtera" to trace back people who have history of checked in the restaurant. In other way, this pandemic help EHO / AEHO to reduce challenges the usually faced before the pandemic.

Post-disaster policy formation is more vital since victims urgently require government assistance to give temporary and implement disaster recovery mitigation to improve welfare and the life of the victims after a disaster (Shafiai & Khalid 2016). Moreover, Roosli, & O'Brien (2011) reported that post-disaster policies remain ineffective in terms of confusion in the implementation of the policies implemented by the government. This gives an impact to disaster management as it becomes ineffective. Community involvement in policy planning is necessary in order for a person to realize their human potential and make more comprehensive aid actions. Flood disaster management policies have been established in Malaysia on the basis of the top-down theory that does not fulfil the demands of the victims. Concern also has been reinforced by previous studies that the Malaysian government is less sensitive to the flood relief operation as the government acts after the disaster and does not look at the strategy as a plan for the next event. There are still some issues during and also for post-disaster stages in Malaysia recovery phase.

As for trans-boundary haze, Malaysia and Indonesia can use the US-Canada Air Quality Agreement 1991 as a framework or indicator for addressing transboundary haze pollution and to prevent the deterioration of air quality in both countries. US-Canada Air Quality Agreement 1991 approach should be applied in this collaboration because this agreement has proved that cooperation between the two countries can lead to environmental improvement and diplomatic relations. If this approach fails, the affected countries may submit the dispute to the Regional Joint Commission to be established under the agreement (Sarok & Nizam, 2019).

CRISIS MANAGEMENT AND COMMUNICATIONS

Rapid and immediate action is required to save lives, protect safety and stabilize the situation in order to avoid exacerbating the emergency. Environmental health workers should also perform a rapid initial qualitative assessment in order to gather the information needed to begin and to respond correctly and in time. There are several communication challenges relating to pre-crisis of flood such as lack of flood risk management plan such as evacuation plan, rescue plan and others. According to the National Research Council (2013), flood risk management plan is important to eliminate the risk of flood before it occurs. Flood risk management includes conducting vulnerability analysis and implementing mitigation projects. Vulnerability analysis should be conducted where it produces maps in order to detect flood prone areas. Other than that, stormwater management is also included in the flood risk management plan to reduce the flood risk flow from the river. Moreover, Manuel, (2014) stated that the lack of public outreach and education is also one of the communication challenges before the flood crisis, including an emergency exercise involving neighbouring communities that can share mutual benefits by sharing and exchanging critical resources.

Based on previous study by Yusoff et al., (2018), several technologies can be used in order to manage flood in Malaysia including short message service (SMS) and social media such as Facebook and Twitter. However, there are some challenges faced by our country during the flood where the public enjoys posting fake news regarding floods to get publicity. Moreover, loss of internet connection due to flood is a major issue where flood victims cannot contact rescue teams in critical situations. Other than that, lack of coordination among rescue teams during flood due to lack of emergency training is also another challenge faced by the public where the late response and rescue is given by the local authorities (Van Ackere et al., 2019).

One of the challenges of post crisis of flood is lack of flood awareness program conducted where the public still throw away rubbish in the drain which can cause blocking for drainage systems and lead to flood (Samsuri et al., 2018). Lack of enforcement by local authorities regarding environmental issues is also another challenge where urbanization is getting out of hand. Normally, the porous nature of the forest floor allows rainwater to penetrate into the ground. The Star, (2016) stated that the impermeable surface of concrete jungles does not allow rainwater to penetrate to the ground, thus causing huge volumes of water to enter drains and rivers very quickly. Therefore, the Environmental Health official implies the following role in this situation. Ensure the solid waste is properly processed, collected and handled, provide information on any future health issues and provide direction, supervision and liaison for businesses and the general public.

While in transboundary haze lack of communication and coordination from responsible agencies in enforcing legislations in order to avoid the occurrence of haze. Fail of communication between relevant agencies will lead to the increase in open burning in Malaysia. Sarok & Nizam (2019) stated that lack of communication on disaster preparedness among communities can also lead to the increase of transboundary haze. Community understanding is important in this process in order for a plan to be effective. Coordinated participation including local, national and international levels will help to work out problems when a disaster occurs. Apart from that, lack of coordination and communication among neighbouring countries is also another challenges for pre-crisis of trans-boundary haze where open burning will be conducted anytime without considering neighbouring countries (Tay et al., 2016)

Communication challenge faced by our country during the event of trans-boundary haze is misunderstanding communication between rescue teams relating to trans-boundary haze. Lack of communication in terms of environmental education regarding the trans-boundary haze issues cause the public to start conducting open burning to increase the country economy and urbanization (Sunchindah, 2015). Other than that, lack of enforcement by local authorities to the company in Malaysia which is the culprit is another communication challenge during trans-boundary haze said (Jones, 2014).

Moreover, communication is important in handling pandemic outbreaks such as COVID-19. However, there are several communication challenges regarding the COVID-19 pandemic outbreak issues especially among imported cases where they do not follow the Safety Operating Procedure (SOP) which require them to quarantine themselves at home for 14 days. In addition, COVID-19 swab test was not performed on foreign workers because the company could not afford to pay for it. Moreover, the public would not bother the COVID-19 SOP especially when festive season is coming (Azhar et al., 2020). Public started not to neglect the SOP such as no social distancing and not wearing surgical masks at crowded places due to the number of daily cases reduced to two digits compared to previous months. In addition, another communication challenge is when fake news goes viral which causes racism and chaos in the country.

During severe floods, transboundary haze events and even COVID-19 pandemic, MOH through CPRC was already prepared with pandemic crisis communication. Operation Room will be activated, hotline phone number included chatroom, e-mail, phone calls etc will be activated too. This is purposely to guide appropriately concerned people through serious hazards and help people bear the situation and act wisely in the face of overwhelming emotions, outraged and frightened citizens.

CRISIS TEAM'S DECISION MAKING AND RELATED TASK PERFORMANCE

Decision making in environmental health can be a difficult task, because there is a need to explore and strike a balance between three key elements which are research, policy, and public needs. Policymakers also struggle with how correct decisions can be taken when the work is vague. The policymaker's job is to make the right decision in a straightforward way, using the best available data. Complex crisis situations affect the roles of several agencies, namely government departments, first responders and key infrastructure

agencies. The needs established by major disasters require comprehensive planning, cooperation and communication between the agencies (De Koning et al., 2017).

Emergencies in public health also include tough decisions such as what are the appropriate time to disclose risks to the public, the suitable time to close schools or cancel public activities, the time allocates to dispense medicine, and how to distribute scarce resources. Public health professionals still have little to no experience in crisis decision-making and may be frustrated with the need to make decisions based on knowledge that is often unreliable and limit time lines. Sadly, there are no proven mechanisms to define, assess and strengthen the decision-making processes for public health emergencies.

Since crisis management is a decision-making mechanism, the experience, expertise and characteristics of group decision-making should be important for the success of the crisis team. When an unforeseen emergency situation interrupts regular activities and threatens to affect an organisation, individuals from various fields of expertise also become crisis teams. Such multidisciplinary teams must exchange details quickly and take multiple decisions to tackle the situation (Bigley & Roberts, 2001). Preventive measures should be strongly monitored and implemented in our health-care system and public. The precautionary principle will be at the forefront and core as governments and public health authorities plan for a return to normal. Both policy choices should be taken as the prime concern for the public interest, particularly in the face of on-going uncertainties. Safety as the COVID-19 lockdown has been made clear and must be taken into account not only the position of this new coronavirus, but also its implications. When risk reduction plans are developed, the unequal impacts of COVID-19 across populations need to be addressed. Such policies have to tackle intersectional factors such as class, racialization, mobility, employment, transportation and other health issues. The way forward for public health is to follow the precautionary principle, with an emphasis on primary disease and disease prevention.

COORDINATION IN EXECUTING DISASTER MANAGEMENT AMONG AGENCIES

In order to counter and reduce the impact of crisis, all resources and facilities available in society need to be deployed in the field of crisis management according to their roles and constraints. In addition, it is important to provide a comprehensive approach to planning, implementing, tracking, reviewing the relevant programs and delivering the basic requirements, sufficient coverage, increased connectivity and high-quality service. Close partnerships between organizations that need their help in the event of a natural disaster, so that everyone is aware of their obligations to each other and works together to accomplish a shared purpose, under the predetermined plan. In Malaysia, the National Security Council Directive ruled the flood management (Yusoff et al., 2016).

However, Islam et al., (2016) stated that the National Security Council Directive is not the company responsible for flood management in Malaysia but only provides the policies and guidelines on disaster management. Lack of coordination among responsible agencies in disaster management has been identified during flood in Kelantan around 2014 and 2015. The number damage of dwellings was huge as an unexpected number. According to Chong & Kamarudin, (2018) the most pertinent role and responsibility of various agencies are obviously focused on response in the post-disaster phase instead of pre-disaster in disaster management cycle such as prevention, mitigation and preparedness.

The prevention and control activities were carried out by the state and district public health teams prior to the flood, during and post flood. Those activities contributed to the low occurrence of communicable diseases and outbreak related to flood. In addition, flood disasters in Malaysia have severe psychosocial consequences too. The emotional pain, suffering and loss during the following disaster can lead to emotional distress and psychosocial disorder due to proper psychosocial care and intervention can limit these effects. Haze episodes originating from large scale forest fires have happened frequently since 1990. It is also useful for policy makers to improve environmental and public health plans. The research investigates air pollution index in selected places of Malaysia and Singapore to explore haze episodes, and to discover as much evidence as possible to trace the origin of the phenomena such as satellite images and hotspots evidences.

The question of trans-boundary haze contributes to the evaluation and a deep desire to learn how the community responses and appreciate the steps or regulations the government has taken to mitigate the haze problems that have brought major impacts to the community's livelihood strategies before, during and after the haze (Cheong et al., 2019). Therefore, the group lacks little information about trans-boundary haze emissions and how they are understood and exposed when haze happens to protective measures and reminders. Furthermore, a seasonal trans-boundary haze problem has become chronic in Southeast Asia and is of major public health concern. While there has been a lack of evidence from many low-middle-income countries, current studies from some of the countries affected indicate significant adverse effects on psychological, cardiovascular respiratory, neurological morbidity and mortality.

Based on the World Health Organization in Health Emergencies Program under COVID-19 supply chain system, the task force oversees a coherent approach in which participating partners benefit from stable and proven systems, processes and methods while creating the need for broader co-operation in these exceptional situations are also demonstrated. The Supply Chain Task Force, co-chaired by the World Health Organization, includes representatives from each participating organization (WHO, WFP, UNICEF, OCHA, World Bank, Global Fund, UNOPS, UNDP, UNFPA, UNHCR, NGO, Red Cross and Federation) and other cluster partners. They are responsible for fulfilling their agency's commitment to this critical process and fully empowered to act smoothly and appropriately. Based on WHO worldwide guidelines (2020), coordination, planning and monitoring at country level should include national public health emergency response mechanisms involving relevant ministries such as health, education, travel and tourism, community service, the environment, social protection and agriculture. Several current public health policies including law enforcement on COVID19, monitoring and tracking techniques, and sharing information have shown positive results and should be further strengthened (WHO, 2012).

CONCLUSION

There is still a significant difference between commitment to policy and implementation. Most agencies still give far too little assistance to improve emergency preparedness and disaster prevention. Compromised in emergencies and disasters, EHOs responsibilities in these circumstances start from the time before the catastrophe happens. Various industries need to work together. The environmental health policy can be used as part of the overall health planning process. Rural and urban populations have to fully engage in both disaster response and development processes that need a dedicated, open team of practitioners and volunteers. It will provide a supportive structure for frontline workers' improvisation in meeting those needs, and will encourage change across all phases of the emergency response process. Revised and updated plan of actions is a guide to develop new strategy and implement a wide range of actions and interventions for crisis management. Actions and interventions will be evaluated to assess the impact of activities and help us strategize.

CONTRIBUTION STATEMENT

MAEH Focus Group Discussion 2020 was held via teleconference from 25 June - 25 July 2020. SS, NM, INS, NAR, MFI and FAS conceived the forum and drafted the first version of the discussion. MAMM, JJ, FAB, MM, PGKS and SK analysed the topic. All participants produced the article and approved the final version.

REFERENCES

Azhar, Z. I., Chen, X. W., Mohamad, M., Saman, M. S. A., Isa, M. R., & Ismail, N. (2020). COVID-19 Review: An Epidemiological Perspective and Malaysian Scenario in Handling the Pandemic (January–May 2020). *Journal of Clinical and Health Sciences*, *5*(1), 26-41.

Bigley, G. A., & Roberts, K. H. (2001). The incident command system: High-reliability organizing for complex and volatile task environments. *Academy of Management Journal*, *44*(6), 1281-1299.

Cheong, K. H., Ngiam, N. J., Morgan, G. G., Pek, P. P., Tan, B. Y., Lai, J. W., Koh, J. M., Ong, M., & Ho, A. (2019). Acute Health Impacts of the Southeast Asian Transboundary Haze Problem-A Review. *International journal of environmental research and public health*, *16*(18), 3286.

Chong, N. O., & Kamarudin, K. H. (2018). Disaster Risk Management In Malaysia: Issues And Challenges From The Persepctive Of Agencies. *Planning Malaysia Journal, 16*(5), 105-117.

De Koning, L., van Dongen, K., Thönissen, F., de Vries, T., & Essens, P. (2017). A tool to quickly increase knowledge for effective coordination in crises. In *ISCRAM*.Islam, M. S., Pei, Y. H., & Mangharam, S. (2016). Trans-Boundary haze pollution in Southeast Asia: Sustainability through plural environmental governance. *Sustainability (Switzerland)*, *8*(5), 1–13.

Islam, R., Kamaruddin, R., Ahmad, S. A., Jan, S. J., & Anuar, A. R. (2016). A Review on Mechanism of Flood Disaster Management in Asiaf. *International Review of Management and Marketing*, *6*(1), 29-52.

Jones, W. (2014). Human security & ASEAN transboundary haze: An idea that never came. *Journal of Alternative Perspectives in the Social Sciences*, *5*(4), 603-623.

Manuel, J. (2014). Crisis and Emergency Risk Communication: Lessons from the Elk River Spill. *Environmental Health Perspectives, 122*(8), A214-A219.

National Research Council. (2013). *Levees and the national flood insurance program: improving policies and practices*. National Academies Press

Roosli, R., & O'Brien, G. (2011). Social learning in managing disasters in Malaysia. *Disaster Prevention and Management: An International Journal*, 20(4), 386-397.

Said, M. Z., Gapor, S. A., & Samian, M. N. (2017). Konflik di pusat pemindahan banjir: Kajian Kes di Daerah Padang Terap, Kedah (Conflicts in flood relief shelter: A case study of Padang Terap District, Kedah). *Geografia-Malaysian Journal of Society and Space*, *9*(1), 69-78.

Samsuri, N., Abu Bakar, R., & Unjah, T. (2018). Flash flood impact in Kuala Lumpur–Approach review and way forward. *International Journal of the Malay World and Civilisation*, *104*(6), 69-76.

Sarok, A., & Nizam, M. N. (2019). The Communities Understandings on the Roles of Government in Mitigating Trans boundary Haze Pollution in Sarawak Malaysia. *The International Journal of Social Sciences and Humanities Invention,*6(6), 5500-5512.

Shafiai, S., & Khalid, M. S. (2016). Flood disaster management in Malaysia: A review of issues of flood disaster relief during and post-disaster. In *International Journal of Social Science and Humanity. Conf* (No. 1983, pp. 1-8).

Sunchindah, A. (2015). *Transboundary haze pollution problem in Southeast Asia: Reframing ASEAN's response.* https://www.eria.org/ERIA-DP-2015-82.pdf

Tay, S., Chen, C.L., & Yi, L.X. (2016). Sounthern Asia's Burning Issue: From The 2015 Haze Crisis to A More Robust System. *Policy Brief, April Singapura: Singapore Institute of International Affairs.*

The Star. (2016). *Multiple causes of flooding _ The Star*. https://www.thestar.com.my/opinion/letters/2016/11/18/multiple-causes-of-flooding/

Van Ackere, S., Verbeurgt, J., De Sloover, L., Gautama, S., De Wulf, A., & De Maeyer, P. (2019). A review of the internet of floods: Near real-time detection of a flood event and its impact. *Water (Switzerland)*, *11*(11), 2275.

Whiley, H., Willis, E., Smith, J., & Ross, K. (2019). Environmental health in Australia: overlooked and underrated. *Journal of Public Health*, *41*(3), 470-475.

World Health Organization (WHO) Regional Office for the Western Pacific. (2012). Malaysia health system review. Manila : WHO Regional Office for the Western Pacific.

Yusoff, I. M., Ramli, A., Alkasirah, N. A. M., & Nasir, N. M. (2018). Exploring the managing of flood disaster: A Malaysian perspective. *Geografia-Malaysian Journal of Society and Space*, *14*(3), 24-36.