



The Delivery of Environmental Health Services in Malaysia: The Current Status and The Way Forward

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INTRODUCTION

Environmental health comprises of the effect of human man-made hazard or natural hazard towards the environment and human health which include identification of the impact of those hazards, the source and preventive measures that is needed to be taken into consideration. According to WHO, environmental health addresses all the physical, chemical, and biological factors which is external to a person, and all the related factors impacting towards behaviour. It includes the assessment and control of these environmental factors that can potentially affect health (Rinkesh, 2017).

It is targeted towards preventing diseases and creating a health-supportive environment. Rapid urbanisation is the major cause of environmental health hazards in many countries. It includes contamination of air, water, and soil. Sprawling urban areas contribute to traffic congestion, with is associated to air pollution, noise and long commuting times affecting public health and productivity across the world (Vardoulakis et al., 2016). There is a significant environmental impact of urban activities towards the environment and human (Ofori et al., 2000). The main types of environmental impact are global warming, abiotic depletion, human toxicity and reduction of ozone layer (Tukker et al. 2006).

Figure 1 is the list of most concerning environmental issue in Malaysia according to Malaysian citizens (Müller, 2019). It shows that respondents believe that global warming or climate changes are the most concerning environmental issues that need to be more seriously approached. Environmental impacts have direct effects on health, both in the short term and long-term periods.

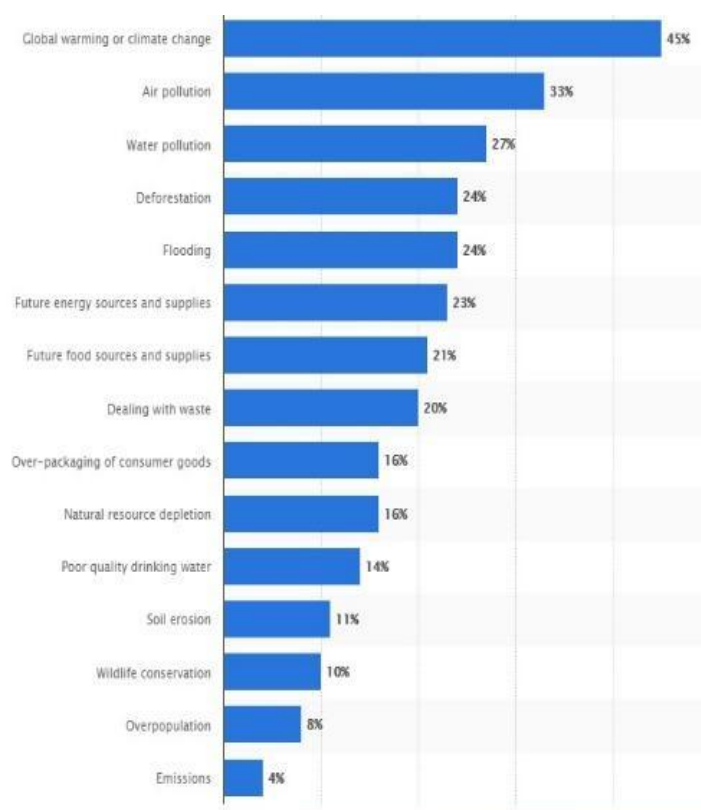


Figure 1: Most concerning environmental issues according to citizens across Malaysia in 2019

A few years ago, Malaysia had faced major environmental problems that lead to negative impacts towards environment and human health. In 2019, the whole country was shocked with Kim Kim river water pollution that led to the dispersal of dangerous chemical towards Pasir Gudang community. Moreover in 2019, Malaysia experienced haze episodes which were caused from agricultural open burning that consequently gave rise to the Air Pollutant Index (API) in many states. Recently, the emergence of COVID-19 virus world pandemic caused global lockdown because of the spread of the virus infection towards human health. All these environmental health issues have been managed by the environmental health officers, known as the frontline workers. They were the first to implement the plans and carry out corrective actions to minimise the impact towards environment and human population. Strategically, in order to deliver environmental health services effectively, it had been categorised into preventive, treatment, education and operational research measures. In these categories different healthcare professionals whether government agencies or private sector such industrial and Non-Governmental Agencies (NGOs) were involved in delivering environmental health services.

One of the plans included in the environmental framework in Malaysia is the National Environmental Health Action Plan (NEHAP). NEHAP presents the strategies that can be implemented to improve the environmental health within the country and also address the roles played by all major stakeholders. This national framework will provide the basis of the government's approach in the direction of sustainable development, socio-monetary development, protection of the environment, and promoting and protection of human health. Hashim, (2019) mentioned that NEHAP Malaysia had come out with Priority List of Environmental Health Issues in Malaysia (towards 2030) that need to be looked into, which are:

1. Children environmental health (birth cohort study, impact of indoor environment).
2. Vector borne diseases such as dengue and malaria
3. Contamination of drinking water sources and emerging water pollutants such as endocrine disrupting chemicals (EDCs), pharmaceutical drugs (antiseptics, antimicrobials)
4. Urban health issues such as poor housing and sanitation, Crime rate, security and many more.
5. Climate change
6. Food safety and contamination such as incomplete food labelling, untrained food handlers especially among foreigners and non-compliance for food standards.
7. Pesticides contamination
8. Human exposure to environmental chemicals from industrial and daily products.
9. Zoonotic diseases such as rabies and leptospirosis.
10. Exposure to ionizing and non-ionizing radiation.

Therefore, these are the challenges awaiting healthcare professionals or stakeholders in delivering and implementing environmental health framework. The following section will discuss on the current roles and responsibilities of the Environment Health Stakeholders in Malaysia.

ENVIRONMENTAL HEALTH STAKEHOLDERS IN MALAYSIA

Stakeholders are a group of people in an organization where their involvements, actions and decisions influence in the environmental health delivery. The stakeholders in Malaysian Environmental Health are listed in Table 1. The table summarizes the general functions of the listed stakeholders.

Table 1: Roles and Responsibilities of Stakeholders

Category of Stakeholder	Agencies/ Institutions	Function
Federal Level	Ministry of Health (MOH)	● Implement Health Policies and Planning. ● Involved in Public Health Activities for managing Communicable Disease and Non-Communicable Disease. ● Implement regulation and enforcement ● Planning for Health Guidelines and Standards
	Department of Environment (DOE)	● Prevent, eliminate, control pollution to enjoy a better environment and comply with the Environmental Quality Act 1974 and related regulations.
	Department of Irrigation and Drainage	● Collect and analyse hydrological data for the development and management of water resources. ● Implement the plans for development and management of water resources. ● Provide hydrological plan strategies in case of flood or draught.
	Department of Occupational Safety and Health (DOSH)	● Promote safe and healthy workers at workplace. ● Conduct research to reduce accident, injuries or occupational diseases at workplace.
	Ministry of Environment & Water (MEWA)	● Responsible for issues involving climate change and biosafety and spearhead the growth of the green economy. ● Strengthen the management of the water ecosystem.
	Ministry of Housing and Local Government	● Responsible for urban related issue, town and country planning, fire and rescue authority, local government, solid waste and landscape.
State Level	Health Department	● Improve public health through the control of infectious and vector borne diseases. ● Enhance the involvement of residents and other parties in maintaining public health.
	Water Resources Management Authority	● Manage licensing and monitoring of the water services industry.
Local Authorities	Kuala Lumpur City Hall (DBKL)	● Provide public health services and control pollution. ● Plan and control urban development.
	City Council such as Majlis	● Provide services such as roads, traffic planning,

	Bandaraya Petaling Jaya (MBPJ)	housing, economic and community development, environment, recreation and amenity services
Private sector	Waste Management Concessions (e.g. Alam Flora Sdn. Bhd /KDEB/E-idaman)	Provide waste management services such as recycling, waste storage and waste disposal.
	Industries	Involved in food manufacturing, food supply chain, hospitality, construction, plantations, farms, etc
NGOs	Malaysian Association for Environmental Health (MAEH)	- Promote and share knowledge about environmental health. - To encourage interest for the Profession of Environmental Health Practitioners.
	Association of Environmental Health Officer (EHOM)	- Increase professionalism among members - Gather personnel who are involved in environmental health. - Provide association to agencies which are involved in environmental health.

The stakeholder's views on environmental health are very vital for the improvement and enforcement of laws, policies, prevention control and effective management of public health. The support from the government and all related stakeholders are pertinent to deliver an effective environmental health services.

CHALLENGES IN DELIVERING IN ENVIRONMENTAL HEALTH SERVICES

Crisis, Rumours And Communication

When a crisis occurs in a country, the most valuable thing is the availability of information. There is a need to distinguish between the real news or rumours especially with the emergence of information sharing by social media that can be spread by seconds. The roles of stakeholders are vital to control the information sharing whether among the stakeholders themselves or to the public. The inconsistency of report by stakeholders causing confusion among the authorities to take immediate action. Public also experiencing difficulty due to ineffective communication and updates regarding the major issues from the government through media. This led to a rumour going driving into unnecessary panic.

Some important issues that can be looked into from any tragedies are the role of media in providing timely and useful information during the critical time (Leask et al., 2010). Information sharing between agencies also needs to be strengthened. For example, in handling toxic waste arriving at the port, the first agency involved is the Royal Malaysian Customs Department (RMCD). The RMCD will need to share detailed information on hazardous chemicals with all stakeholders such as the Department of Environment, Ministry of Health Malaysia, local authorities, and others. This step needs to be continued in every user chain until the toxic substance becomes waste and sent to a licensed disposal site for appropriate action.

Barriers to Effective Education

Environmental Education (EE) can be defined "as a process aimed at developing a world population that is aware of and concerned about the total environment and its associated problems, and which has knowledge, attitudes, motivations, commitments and skills to work individually and collectively towards solutions of current problems and the prevention of new ones" (Lateh and Muniandy, 2010). The basic concept of EE is education on the environment, for the sake of the environment by using the environment.

Ministry of Education of Malaysia has taken drastic action to include environmental education (EE) into the school curricula of Malaysia to promote sustainable development and improving the capacity of people to address environmental and developmental issues. Others government agencies that are involved in promoting environmental education are the Department of Environment (DOE), the Department of Wildlife and National Parks (DWNP), municipals councils and non-government agencies (NGOs) such as the Malaysian Nature Society (MNS), the World Wide Fund for Nature (WWF), Treat Every Environment Special (TrEES) and Wetlands International. An example of EE programs conducted is the School Nature Clubs or Kelab Pencipta Alam (KPA). KPA is an example of EE-related clubs active in schools and supported by the Ministry of Education. The club's objectives are to promote interest and understanding as well as to promote student involvement in any sort of conservation of environment activities as the introduction to environmental health should be introduced as early as primary schools. However, absence of specific environmental education syllabus in schools makes it difficult for teachers alone to address environmental health without assistance from the experts (Loubser et al., 2014). Information and guidance from environmental health specialist can be a great help to improve the current content of environmental health education. Sungai Kim-kim episode highlights the importance of our school health program to be continuously conducted and not only looking into the school canteens. The holistic nature of public health risk assessment process should be the primary concern, especially in the public interest areas.

Meanwhile, environmental health professionals are dedicated to conserve the environment to lower the risk of human disease, as well as improving human health and well-being. The quantity and quality of the environmental health professionals have been an issue (Walker et al., 2018; Massoudi et al., 2012). Knechtges and Kelly (2015) in their paper had focused on the issue of educating environmental health professionals. However, it is important to know the difference between training and education. In simpler words, training is the "Know-How" and education is the "Know Why". When practicing environmental health, it is not enough to rely on "Know-How" alone. "Know Why" also plays an important role in understanding the underlying reasons behind a procedure or standard. This distinguishes professionals from technicians. Environmental Health professionals with proper education and training will be able to develop solutions to unprecedented problems that may not be routinely procedural. New independent regulatory board or body (Malaysian Allied Health Profession Council-MAHPC, 2020) established according to the Allied Health Professional Act 774 will certify the graduates to become competent personnel and also contribute towards the reasons why environmental health practitioners will be involved in the decision-making process as well as raising the standard of the allied health profession. This independent regulatory body is important to assess the training or courses that has been completed by the graduates and are sufficient to ensure the graduates to become a competent person and able to conduct their work effectively.

Many Environmental Health Science (EHS) academic programs in colleges and universities are facing budget reduction due to the low number of students enrolled each year. The reasons behind this may be due to fewer job opportunities and poorly defined career opportunities for environmental health degree holders within the government and private sector. The rising number of online courses

and degree programs also poses significant challenges to EHS academic programs. Higher education institutions should also conduct knowledge sharing sessions with the field practitioners and the industry more frequently to share the new available information from the research that had been conducted by the experts as well as getting inputs or feedbacks from the industry on how the situations may differ in the field.

Besides environmental health professionals, other health professionals and clinicians should also involve or take part in an environmental health education program to take care of the workers and the public. Mujuru and Niezen (2004) stated that due to the limitation on including environmental health course in nurse's education curriculum may lead them to fail to provide sufficient emergency care during the threats of environmental exposures are expected as they do not consider the environmental exposure while tracking a patient's history. Education department should collaborate with environmental expertise when constructing or planning the environmental health syllabus in schools and higher education levels.

The success of environmental education is challenged by a few barriers such as conceptual barriers, logistical barriers, and educational barriers. Conceptual barriers are when there is a lack of agreement on the scope and content or syllabus of the EE. The shortage of attachment and training has failed to prepare the students or future environmental health practitioners for the environmental and public health workforce, ensuring them to be capable of coordinating and come out with alternative approaches to EH problems. Logistical barriers mean there is a lack of time, financial support, and resources. Cooperation between government and non-government agencies in providing funds and resources to prepare a suitable comprehensive syllabus can be a great help in promoting environmental education among environmental health professionals (Tewksbury and Harris, 1982). For instance, Sanitary Survey activities should utilise the Department of Environment (DOE) database on the river quality monitoring system and water quality index. Teachers or trainers with wide knowledge and experiences on environmental health will be a great help to solve educational barriers in environmental education as they can share their experiences and will be able to expose the reality of environmental health in Malaysia. However, this strong EH collaborative partnership should make the ministries able to work without border especially in terms of data sharing which is more economical for environmental monitoring activities.

Chamhuri (2005) stated that the lack of coordination between NGOs, governments, and media agencies has caused a delay in assistance and the distribution of aid during the Asian tsunami disaster back in 2004. Absence on early system warning on this kind of natural disaster also contributes to this massive destruction. Cooperation between media and government agencies can also help to educate the public on this natural disaster besides distributing the information in all stages before, during, and after more accurately and quickly. Many studies have proved that public awareness, public concern for the environment and the readiness to bear the cost of the adverse impacts of human activities are the major factors that can help to overcome the fright of natural disaster which in this case was the tsunami which is a whole new thing to us. Japan is a good example on how they manage the risk, educate, and create awareness among citizens during natural disasters. Environmental experts also highlighted how the information is being delivered to the public (Ramírez et al., 2019). For example, during the current air pollution risk communication, the use API or Air Pollutant Index is used to monitor the situation. When the API result comes out, stakeholders cannot assume that the public can understand the meaning behind it. Another technical barrier to the successful delivery of environmental health is the language. Most sources are available in English and some of it come in Bahasa Malaysia, but not in spoken languages in Malaysia such as Mandarin and Tamil. Public awareness and support for environmental protection play an important role in the success of government efforts and

policies in delivering environmental health services and solve all the environmental issues (Chin et al., 2019).

Other challenges that can disrupt the success of an environmental health delivery system are the lack of training of Environmental Health Officials on how to assist or respond to environmental problems in an integrated and comprehensive way. With only a small number of them who have been trained to predict and prevent the pollution to occur or make effective use of the reduction tools beyond the command-and-control regulations. Some challenges in environmental training are to promote "competent person" to all Department of Environment (DOE) staff, industries, consultants and services providers, promoting the accumulation of CPD hours and promoting the transformation of command and control of enforcement approach into guided self-regulation. There is also lack of Environmental Health Surveillance System to enable EH professionals to make risk decision-making process easier, which will cause many EH issues being neglected and not being pursued by EH professionals and might be taken up by other professionals. Many EH professionals in Malaysia were trained as reactive professionals rather than proactive professionals, they generally proceed with current and lack of prediction and forecasting skills. They were trained but not officially certified by any regulatory body and perform work on the basis of attachment. Regulatory body who governs the professionalism, ethics and competency should be made available to ensure the professionalism of the profession.

Solving Methods by Stakeholders

Solving methods or decision-making process are vital to have an effective environmental health delivery. The authorities usually allow the law makers and the stakeholders to implement and enforce the law needed to work together effectively with limited resources. Participants in stakeholder processes have a variety of problem-solving options, each of which has strengths and limitations. Number of, facilitators, and participants have not made effective use of, knowledge and practices developed over time. For example, in the issue of Sungai Kim Kim pollution, it has had been timely reported but there is no significant action taken by the authorities (Keshavarzifard et al., 2018). The scientific monitoring data is needed to treat it with high importance and governing bodies should be working closely with those researchers for the benefits of public, especially in air and water related work (Yap et al., 2019).

The conflicting role of the federal and state governments can be problematic in dealing with environmental issues when the state and federal governments are of different political backgrounds. Take for example the Integrated River Basin Management (IRBM) issue. The framework adopted is still less effective in addressing rivers and water management issues in Malaysia (Chuan et al., 2013). There are too many government agencies involved in various aspects of river management, with no single agency directly responsible. The issue of federal and state government disputes over water supply is one example of non-integrated management. According to Chan (2012), rivers and urban drainage must be managed well before achieving good water quality in order to maintain water resource sustainability. Poor understanding and change of top management staff have led to delays in the Integrated Urban Water Management System (IUWM) which requires alignment of urban development and basin management to achieve sustainable economic, social and environmental goals (Bahri, 2012).

DELIVERY OF ENVIRONMENTAL HEALTH: THE WAY FORWARD

The Environmental Health service in Malaysia encompasses a wide range of public health institutions from government, private and non-governmental organizations (NGOs) who provide health services through prevention, control and law enforcement. Despite the challenges faced today on issues of globalization and sustainable

development, the delivery of Environmental Health services has been a major step in the face of challenges and concerns in maintaining the strength of the current public health system. The rapid development of high-tech physical and industrial as well as technological advancements in the field of public health requires increased knowledge and skills in the field of Environmental Health to address new emerging issues. These developments affect the roles and responsibilities of public health including environmental health delivery system that needs to be expanded, and streamlined.

Environmental Health Groups have an identifiable 'stake' in the future with a set of goals and measurable criteria or indicators. The potential future of Environmental Health delivery system, must consider the accessibility of information technology and which is associated with decentralization of decision-making in large institutions; increased transparency of organizations whose decisions have an impact on environmental quality; enhanced capacity of communities to participate in stakeholder processes; and policy commitments made by government agencies to improve stakeholder engagement.

Enabling Information Technology Knowledge Sharing

Environmental Health is a public health field that addresses a variety of factors around us that affect our physical and mental well-being. Malaysia's challenge in delivering Environmental Health services in the future need to be more realistic. Effective delivery of environmental health services includes partnerships collaboration between agencies in maximizing the use of data and information to generate new knowledge that can be exchanged, shared and incorporated with other agencies (Erwin et al., 2019). Like other developing countries, Malaysia needs to have a comprehensive community of Environmental Health (EH data base) systems as well as a cohort exposed to environmental agents so that environmental epidemiological methods, modelling techniques as well as forecasts of exposure risk and health impacts can be evaluated either in the short and long term. For example, the use of Pasir Gudang community data exposed to health threats from water and air pollution is used in the assessment of exposure based on scientifically and systematically planned methods. In addition, other than conducting cross-sectional epidemiological studies and case studies, retrospective and prospective cohort studies should also be carried out in the communities involved so that we can identify hazards or mitigation in the community at risk for preventive measures to be identified in the early stages before the issue becomes more serious.

During the Crisis and Disaster Management, the objective of the Environment Health professionals is to prevent and reduce any possible misfortunes from risks and hazards, guarantee instant and provide suitable help to the survivors of the disaster. The Environment Health Professional aims to accomplish quick and effective recovery affect from the disaster. Besides that, even though the fact of the information, data and resource sharing can improve the standard of operating procedure of Crisis and Disaster Management, there might be apparent gap in government joint effort and coordination between different stakeholders in solving the environment issues (Dahlan et al., 2013). According to Maidin et al. (2015), the lack of collaboration and exchange of information through agencies will complicate solutions to environmental issues. Each organization has a propensity to keep information relevant. Research carried out has identified the challenges of cross-agency collaboration in information sharing (Othman et al., 2014). This is reflected in the high commitment given by Environmental Health practitioners in all government agencies, private and foreign agencies and NGOs that have been working hard to monitor, manage and evaluate the ongoing COVID-19 outbreak to address and help the community. The 'frontline troops' in the public health to prevent disease are the local Environmental Health practitioners. However, there are some specific suggestions that can be applied to improve the management system to be more efficient, systematic and effective for a long-term community

mitigation plans. One of the neglected duties will be the post-disaster mitigation actions and strategies; EH professionals should be equipped with a group of professional in qualitative research, to understand the thematic, perception and text analytics, in the context of understanding needs or improvement needed, in the event of upcoming disaster.

The failure rate in collaborations especially in communication process for information sharing is a major concern (Marek et al., 2015). According to Eide et al. (2014), cross-agency collaboration is complex and difficult to manage because each of the agency possess different skills, procedure, knowledge and competencies. Hence, the key challenges of collaboration can be categorized into efficient communication across agencies, establishing and maintaining shared situational awareness and achieving adequate organizational understanding. By defining the core competencies required for successful environmental health at the local level and beginning to find consensus about their adoption, the Environmental Health system can be strengthened, and the programs' capacity building can be developed. A robust system to monitor environmental quality trends and information used to mitigate potential health concerns, resource planning, risk analysis and decision-making should be provided by the environmental health surveillance system. The environmental health surveillance system is not fully being implemented by Environmental Health officers, no absolute system under Environmental Health fields, most coming from the other programs. Environmental Health surveillance systems such as using of software available within the agency to conduct research, save the record, communication, analysis and interpretation of data, and tasks to be reported in environmental agents that is needed to be considered by the Environmental Health practitioners. At the same time, the opportunity to use Information Technology for the development of Environmental Health services. Environmental health surveillance system (record, analyse, and predict) environmental agents need to be considered.

Quality Decision Making Processes by Stakeholder Engagement

Effective delivery of environmental health services includes strategic alliances and collaborations between academic institutions and health departments to promote evidence-based decision-making (Brooks et al., 2019). To tackle local issues and improve resilience, Environmental Health practitioners should broaden and enhance current relationships by working together with other public health disciplines such as laboratories, epidemiologists, community health educators), NGOs and universities. Environmental health practitioners are important collaborators in optimizing the value of translational research. It is important to establish new strategic partnerships between academic and government researchers and Environmental Health practitioners in the environmental health field.

According to (Wisner and Adams, 2003), the involvement of various parties in the Environmental Health issue is necessary to rectify the deficiencies in the management of sectoral nature. This indicates that consensus as a result of the agreement of all stakeholders in addressing environmental issues can improve the quality of environmental management in Malaysia. Strategic collaborations between higher learning institutions and health departments will promote evidence-based decision-making in local health services (Erwin et al., 2019). This is reflected in the involvement of various ministries, agencies, educational institutions and the public in dealing with the ever-discussed dengue outbreak. Establishment of a National Dengue Special Task Force aimed at mobilizing agencies and communities in the prevention and control of dengue. The task force includes ministries from the Ministry of Health (MOH), the Ministry of Housing and Local Government, the Ministry of Human Resources, the Ministry of Education, the Ministry of Higher Education, the Ministry of Defense, the Ministry of Works and the Ministry of Communications & Multimedia, including the Local Authorities (PBT). All partners have their own jurisdiction outside the

health sector to implement strategies in the fight against dengue infections.

There is a strong need to prepare Environmental Health practitioners to address the challenges and environmental health problems facing the country in the next century. The value of competency is required by every Environmental Health practitioner to ensure they are able to attend important meetings and decision-making processes. Environmental Health practitioners must have a certification system. A proposal for members under the Malaysian Allied Health Profession Council (MAHPC) to set up a certification of competency body and renewal practising abilities specifically for the field of Environmental Health (e.g. Environmental Health Legislation, Environmental Health Risk Assessment, Environmental Health Epidemiology, Drinking Water Quality, Food Quality and Safety, Vector Control, International Health Control, Industrial Hygiene in workplaces) to strengthen and maintain life-cycle competencies. In addition, with the establishment of this competency body, the Environmental Health profession can determine the appropriate qualifications of each of its members. These professional bodies can also focus and supervise matters relating to Environmental Health Professions which include training, competency and professional development. From this qualification, Evaluation Committee for Expert will verify and recommend to Council for Expert Registration and certification. Examples of recent work on competencies in this field that were implemented in United States include The Public Health Functions Workgroup Project, Competency-Based Curriculum Work Group, The National Public Health Performance Standards Program, The Crossroads Colloquium: An Examination of the Educational Needs for Environmental Health and Protection, The Public Health Faculty/Agency Forum and Committee of National Environmental Health Association (NEHA) on the Future of Environmental Health (Tobertge and Curtis, 2013).

The disaster and outbreak management body can achieve their target during the joint venture of interagency collaboration, vertical and horizontal integration. The definition of vertical integration is the collaboration between a single organization such as the local government between two different levels. Horizontal integration is the integration among different disaster management organization. For example, the incorporation in management and organize the development between the government body, private sector and other stakeholders in disaster management such as the participation from the Fire and Rescue Department Malaysia (HAZMAT Team), National Disaster Management Agency (NADMA), Ministry of Health Malaysia (MOH), Royal Malaysian Police and Ministry of Defence Malaysia (MinDef). Stakeholders should engage with Environmental Health practitioners in line with the decision that they need to establish. According to Menyha et al. (2016), the collaboration efforts bring a lot of benefits to the disaster and outbreak management as it can boost the process of decision making among government and stakeholders. Among them, Research and Development (R&D) between stakeholders' especially Ministry of Science, Technology and Innovation who are involved in innovation and intervention study in overcoming environmental health problems. During the Malaria outbreak, Environmental Health practitioners will investigate, survey and control the disease. Environmental Health practitioners will collaborate with laboratories for sending the sample, survey and control will involve public and local agencies. Besides that, Bryson et al., (2010) also had stated that this collaboration contributes a lot to improve the way of the service delivery and solving complicated problems. In addition, the Epidemic Intelligence Program (EIP) should be included as the key element in the Environmental Health domain. It aims to strengthen the practice of applied epidemiology for enhancing public health surveillance and outbreak investigation. Therefore, the development of competencies in surveillance and rapid response, and conduct of study projects will contribute directly to the enhancement of public health surveillance.

Participation of Structured Stakeholders' in Operational Guideline Production.

The preparedness of Environmental Health practitioners in the face of future challenges, especially in relation to environmental issues, must be mobilized. According to Linzalone et al. (2019), local authorities and government agencies should have compact and precise operational guidelines to provide case-related health information in reports. The involvement of Environmental Health Practitioners is crucial in the implementation of tasks facing the risk of infection to investigate, screen and isolate at-risk individuals in law enforcement. Enforcement of the Public Health Law in Malaysia includes legislation such as the Prevention and Control of the Infectious Diseases Act 1988 (Act 342), Destruction of Disease-Bearing Insects Act 1975 (Act 154), Food Act 1983 (Act 281) and Food Regulation 1985, Food Hygiene Regulation 2009, Tobacco Product Control Regulations 2004 and the Hydrogen Cyanide Act (Fumigation) 1953 and etc. For example, the power given under the Prevention and Control of the Infectious Diseases Act 1988 (Act 342) allows District Health Officers and Public Health Physicians in a supervisory role of Environmental Health Officers to prosecute individuals who have made or violated legal instructions order to protect the public from health hazards.

Court actions are often initiated against individuals who refuse to pay a compound imposed on other notices that could be compounded by statute. For offenses that cannot be compounded, prosecution in court is carried out from time to time by an authorized officer. Enforcement of public health laws aims to raise awareness among the public. The role of the Environmental Health Officer in providing information and awareness to the public to understand that a lack of health can have a negative impact on them and ultimately be at risk. In addition, public enforcement activities include the issuance of notice and merger of offenses such as mosquito breeding, smoking in non-smoking areas that are gazetted and notices of closure of premises. This shows the scope of the environmental health field in law enforcement is very challenging. The challenges and risks that Environmental Health Officers face are increasing with new emerging issues. Risk assessments need to be carried out as health threats remain.

Municipal issues such as population density and economic sector growth and increased migration are seen to cause various infections. This threat is a serious concern for the involvement of Environmental Health practitioners in Malaysia as evidenced by the recent COVID-19 pandemic. The Malaysian government's action in implementing the Movement Control Order (MCO) has led to a decrease in the number of daily COVID-19 infections. In the early stages of confusion among the public and enforcement agencies on roles and jurisdictions in implementation, the challenge of obtaining compliance from the public for movement control measures was not effectively disseminated. For Environmental Health Officers the challenge in tracking contacts and obtaining movement history information properly is very critical. Therefore, short and long-term preparation in the face of any infection is necessary. In addition, the threat of infectious diseases such as dengue and tuberculosis are a major concern. For emerging diseases, strategies to strengthen the workforce's ability to detect new syndromes or new disease patterns are needed. Monitoring through case investigations and outbreaks will prompt early detection of new pathogens and enable the development of control and prevention methods. As a precursor to disease control and prevention activities, there is a need to strengthen the surveillance system in preparation for the new emergence of infections. All of these require a certain level of responsiveness by the Environmental Health practitioner. Steps must be taken to ensure proper control and prevention activities such as contact tracking, case investigation and enforcement procedures. Most importantly, standard guidelines and protocols are provided to every manpower in providing Environmental Health services. Periodic training for an

Environmental Health practitioner is another important step in ensuring preparedness in all situations.

The competency of policy development implies that an Environmental Health practitioner should be able to go to the Malaysian Allied Health Profession Council (MAHPC) and argue for a specific policy. This task may not be relevant to the starting position. While these tasks are very important to work effectively, they also represent a basic part of job knowledge rather than competence. Environmental Health practitioners, on the other hand, may be involved in policy development. For example, they may consult with each other about what specific regulations (e.g., Solid Waste Disposal Regulation) exist in their community and how those rules are developed. Indirectly, this individual works as an environmental health professional, health administrator and advisor. The Environmental Health Officer is one of the professions included in the Allied Health Profession Act 2016 under Act 477 which provides for the registration of persons practicing as associate health practitioners and persons conducting activities related to allied health, to regulate the practice of the Allied Health Profession, and for matters relating to the profession. The practitioner may apply to be registered as an expert who has undergone specialized training, is awarded a recognized certification and the council is satisfied as a suitable, proper and good person

More stakeholders should be invited during drafting of any Standard of Procedure (SOP), guidelines, acts, regulation and policy. Usually the majority of government stakeholders are involved but experts from NGOs and industries are sometimes neglected. This situation makes it possible for non-governmental stakeholders to contribute their expertise and experience to their environment in solving the environmental health issues.

CONCLUSION

In conclusion, the delivery of environmental health in Malaysia is still in the maturity progress. The collaboration between stakeholders such as at the government and private sector is growing steadily. Through the process of maturing environmental health deliveries, some barriers need to be looked into. Some of the barriers such as in information and communication, effective education and solving method among stakeholders can be solved if all agencies from the federal until the local council level work together strategically. In order to move forward in providing a comprehensive environmental health delivery, there are a few strategic ways to overcome the barriers such as to enable information and technology sharing among the stakeholders, producing quality decision-making processes that involved stakeholders active engagement, and participation of structured stakeholders' in operational guideline production that also involved not just government but also from private sectors. Lastly, for barriers to be broken, it just needs a few good strategies, cooperation, and determination. Over time, by having mutual understanding and overcoming the differences, one day Malaysia will succeed in providing a matured and comprehensive delivery of environmental health towards the community better than any developed countries. Strategic collaboration within the Malaysian environmental health service can be executed as seen in the country's handling of the COVID-19 pandemic. This pandemic had forced the Ministry of Health to work together with various agencies within the government at both federal and state level in an effective and efficient manner to curb the spread of the virus. The collaboration was proven to be a success story as Malaysia had become one of the countries that successfully managed to contain the virus, even better than developed countries such as the United States of America, the United Kingdom and Brazil. Malaysia has succeeded to handle COVID-19 and recognised as one of the leading countries in handling COVID-19 cases. If similar principles of collaboration during the handling of COVID-19 virus are applied towards the environmental health service, Malaysia can stand tall amongst the countries that have environmental health services in an effective manner.

CONTRIBUTION STATEMENT

MAEH Focus Group Discussion 2020 was held via teleconference from 25 June - 25 July 2020. NK, FSAA, SMSB, AAAM, MAAJ, and FAS conceived the forum and drafted the first version of the discussion. SK, SZ, MS, SAI, AAM, KAM, NNK, and SNAT analyzed the topic. All participants produced the article and approved the final version.

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Challenges in Crisis Management on Environmental Health Deliveries in Malaysia

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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.

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Environmental Health Delivery in Malaysia: Environmental Health Law Enforcement

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INTRODUCTION

In Malaysia, the Ministry of Health (MOH) and Ministry of Housing and Local Government (MHLG) are the main backbone to enforce public health legislation. The main objective or intention of public health enforcement which is conducted from time to time is to protect the public from threat or health hazards, besides creating awareness and promoting the public to comply with national laws. Currently the public health enforcement laws are Prevention and Control of Infectious Diseases Act 1988 (Act 342), Food Act 1983 (Act 281), Destruction of Disease-bearing Insects Act 1975 (Act 154), and the Hydrogen Cyanide Act 1953 (Act 260).

Department of Health is responsible to protect public health by conducting intervening activity which includes premises inspection, issuance of writing order to destroy disease-bearing insects or pathogens and writing order the closure of the infected premises, compounding offenders who harboured breeding mosquitoes, compounding who flout the no-smoking rule at non-smoking gazetted areas and selling tobacco products to persons under the age of 18 or school children who have possession of tobacco product. Order of closure (cleaning and hygiene improvement) needs the premises to temporarily close for the purpose of prevention and control activities in case of massive mosquito breeding, stop transmissible disease pathogen or unhygienic food premises. MOH also coordinated fumigation courses, examination and issuance of fumigation licenses for fumigation operators, in accordance with the requirements of the Hydrogen Cyanide Act 1953 (Act 260). The Sector of Inspectorate and Legal (SIP) at the Ministry of Health (MOH) is responsible for

monitoring the public health law enforcement activities conducted throughout the state health departments and district health offices.

Environmental Health Consultation Division (EHCD) in Local Government Authorities plays a key role in the implementation of environmental health policy and monitoring the roles and functions of local authority based on the provisions of the law. The EHCD is responsible to allocate funding to municipal bodies for prevention and environmental health control programs. Local Government Act 1976 (Act 171) is the 'parent laws' regulating city councils, municipal councils and district councils. By-laws (UUK) related to environmental health as provided under Section 73 and Section 102 Local Government Act 1976 (Act 171), has been approved on the 32nd National Council Meeting on Local Government which held on 16 October 1987 to be adopted by Local Authorities and State Authorities. The local authority has the right to create, amend or revoke the by-laws in accordance with the interest of the administrative area of the local authority. According to Ministry of Housing and Local Government (MHLG), there are currently 149 local authorities, consisting of 12 city councils, 39 municipal councils, 98 district councils and five special and modified local authorities in Malaysia (MHLG, 2019). While there are quite a number of local authorities constituted in Malaysia, there are few concerns that need to be resolved to ensure that their roles are completely utilized. Today, public health programs and activities such as food safety systems and dengue outbreak control within the local authority is not fully practiced under their jurisdiction. The local authority in Malaysia needs the Ministry of Health (MOH) to conduct environmental health protection activity in their authority area.

Enforcement officers at the district health office and local authority, authorized under several separate laws, carried out enforcement activities and actions that may vary according to each law. Authorized officers or enforcement officers consist of Environmental Health Officers (EHO), Assistant Environmental Health Officers (AEHO), and Public Health Assistants (in particular laws only) are responsible for improving the environment and protecting human health. In terms of performing enforcement task, all enforcement officers were issued an 'Identification Card' including in the Local Authority. In the Food Act, authorized officers are only to be appointed by the Minister of Health. While in other laws, Director General and District Health Officer are provided in the law to delegate in writing any or all the power in appointment of an authorized officer with the definition of public health inspector and health inspector.

The post of EHO and AEHO was formally established by the Ministry of Health, while all posts of EHO and AEHO in Local Government are on Cadre Post basis by the Ministry of Health Malaysia. District Health Officer or Medical Officer of Health also an authorized officer, plays a supervisory role and local reference professional in terms of clinical and disease epidemiology aspect. EHO and AEHO enforces public health policies and laws, inspects environmental quality-related public facilities, and offers assistance to mitigate health and safety risks, and ensures that the public conform with all local, state and federal health legislation. Through the District's Inspectorate and Legal Unit, EHO or AEHO is responsible in performing the duties of enforcement and prosecution under public health law. EHO or AEHO also involved in preparation for court case, criminal prosecution and court proceedings activities in court against non-compoundable offences or violators who fail to pay any compound amount. Indirectly, EHO and AEHO were responsible to promote healthy lifestyle practices among society. Strengthening the role of EHO or AEHO in Public Health performance should be continuous improvement efforts. The Ministry of Health and local authority are responsible for monitoring and enforcing standards of environmental and public health, including food hygiene, any nuisance's complaint, noise and pollution control, disease and vector control activities and promoting good environmental practices. Environmental safety laws and strategies have been designed to safeguard the most susceptible community. Children, pregnant women and disabled persons are the most susceptible to negative health consequences from exposure to the climate. Environmental safety legislation demands focus and dedication of managers and staff to the environments where all challenges and remedies are apparent.

Enforcement is necessary to ensure compliance with laws, codes of practice, regulations, rules, standards, guidance and social norms. Many workplaces are using different legislation to ensure compliance and lessen ignorance of the law because voluntarism is not very strong. However, Malaysia is still not aggressive in enforcement of environmental policies and regulations as there are many issues arise, including a shortage of qualified personnel and logistics, inconsistencies between federal and state environmental health laws, implementation of new law and a lack of public involvement in solving environmental challenges due to lack of environmental awareness, and a profit-first business policy that promotes industrial development over the conservation of the environment. In the next section, discussions and details of the issues raised are focused on the involvement and role of EHO and AEHO in order to protect public health and exposure to health-damaging hazards.

ENFORCEMENT OF EXISTING ENVIRONMENTAL LAWS AND REGULATIONS

Malaysian legislative system is unique. Although the Federal Constitution is the supreme law of the nation, the Constitution also provides speciality referred to as the Federal List, the State List and the Concurrent List. Civil law, criminal law, finance, trading, communication and transportation are among matter listed in the Federal List, while matter regarding land use, agriculture and forest

are among listed in the State List. The Concurrent List consists of several matters involving public health, sanitation, prevention and control of diseases as well as rehabilitation of mining land and land suffered from soil erosion. Concurrent List allows Parliament and the State Legislative Assembly to make laws for the same matters and so long as they are not in conflict with each other, they can exist and operate together. However, if there is a conflict, then Federal laws would prevail.

I. Bauxite Mining

In Malaysia, mining activities are governed by the Mineral Development Act 1994, which covers environmental protection steps for prescribed activities (effluent regulations, monitoring plans, and rehabilitation of mined areas after mine closure. The National Land Code incorporates activities involving the excavation and transportation of soil. Mining proposals and sustainable conservation are not part of the requirements for land usage under the National Land Code. As a result, there are major issues and conflicts in between the laws because many mining operations are listed only within the National Land Code. Failure of state and national government regulation enforcement in bauxite mining is said due to a lack of regulatory personnel and mining expertise in which the risk assessment stated that for 200 mining sites, only 8 government officials were tasked with regulatory enforcement (Scobell, 2019). Malaysian Chamber of Mines (2009) stated that the two main legal instruments that govern activities relating to mining are the Mineral Development Act (MDA) 1994 and the various State Mineral Enactments (SME). The MDA was implemented in August 1998. Each State has its own legislation governing mining activities. One of the objectives of the National Mineral Policy project was to match these States Laws and a Model State Mineral Enactment (SME) that was prepared. As of the end of 2008, ten States have implemented the SME. If the mining area is more than 250 hectares, then the Environmental Quality Act 1973 will be coming into action, where the Environmental Impact Assessment (EIA) is mandatory to be conducted. Applications for prospecting/exploration licenses and mining leases under the SME, a prospecting license, exploration license and mining lease may be granted to;

- A person;
- A company;
- A body expressly empowered to hold mining land under any other written law of Malaysia; and
- A foreign company as defined in the relevant legislation relating to companies, registered under the said legislation and authorized by its constitution to hold mining land.

Development of industry can be assured and encouraged, as this SME delivers an attractive, efficient, pleasant and stable mineral regulatory framework. It enacted existing laws to cover conditions allowing not only for small scale and labour-intensive mining but also for large scale exploration and capital-intensive modern mining that the country expects in the future (Ahmad Athsani, 2012). The issuance of licenses and leases by the State is subjected to certain conditions and restrictions as prescribed under the SME, are listed in Table 1.a. according to prospecting or exploration, and Table 1.b. according to the scale area of the mining operation.

Table 1.a: Prospecting/Exploration License as prescribed under the SME.

Applied Conditions	Prospecting License	Exploration License
Area for exploration work	25-400 hectares	400-20,000 hectares
Valid period	Maximum 2 years	Maximum 10 years
Extension period	+2 years	+5 years

<i>Application for renewal</i>	Not later than 6 months prior to expiry of the License	Not later than 12 months prior to expiry of the License.
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Table 1.b: Small scale mining operation/large scale mining operation.

Applied mining conditions	Small scale operation	Large scale operation
Target for mining	Alluvial	Hard rock
Area for mining lease	Such size as reasonably required for the mine	
Requirement for EIA	Areas more than 250 hectares	
Term of renewed mining lease	Estimated remaining life of the ore body or 21 years whichever is shorter	
When to apply for renewal	12 months prior to expiry of the lease	

In the new SOP which is entitled and specifically has touch with the bauxite mining activities in Pahang, Environmental Impact Assessment has become mandatory to be conducted regardless the size of the involved land (previously mining is only become prescribed activity when the area is more than 250 hectares), mining sites must be considered the sensitive environmental area, enhancing the number of competent person (before this mining manager must be appointed, but now additional mining engineer and occupational, safety, health & environmental (OSHE) officer must be included) before mining company has been granted with mining license.

Bauxite mining in Kuantan, Pahang, started in 2013, but has controversial issues of environmental pollution, public health and road safety in 2015. Federal Government of Malaysia through Minister of Natural Resources and Environment together with the Menteri Besar of Pahang (State Government of Pahang) has ordered moratorium in bauxite mining for three months (has been extensive for years) until new standard operating procedure finalized and placed into the enforcement by the responsible Ministry (Mazlan et al., 2019). According to Abdullah *et al.*, (2016), has briefly listed out the potential of public health threat due to the bauxite mining activities in Kuantan. The airborne dust not only is the major source for the respiratory health problems but also contributed to road accidents due to visual pollution, burden in water supply system as the dust and leachate deposited into the water source and exposed people with toxicant from the heavy metals that flows with it as well as nuisances to the noise pollution.

II. Logging Activity

In 1996, logging operations and the subsequent environmental destruction at Lojing Highlands in Kelantan made headlines among the media as the condition was deemed "serious" and the Kelantan Government was ordered to conduct urgent restoration work, including replanting of trees. The Department of Environment identified 55 development projects, involving a total area of 135,000 hectares, which were going on in the area. The operation of federal and state authority on environmental concerns can often contribute to contradictions between federal and state laws. Inconsistency arises when two laws on the same subject applied to the same facts produce conflicting results. These may also be contradictory as specific penalties are levied on the execution of identical environmental crimes. In order to address issues of confusion between federal and state laws, courts can at first attempt to find a harmonious understanding of what appears to be a contradictory federal and state law (Saleem, 2005).

The implementation of National Forestry Act (1984) is to strengthen the management of planning and operations, also to strengthen the provisions for safeguarding and protecting forest

resources from illegal logging. It was amended in 1993 to provide penalties for forest offenders. It gave a huge impacts to the forestry sector especially illegal logging. Illegal logging is still under control, which is 226 cases or average 38 cases per year (2005 – 2010). But long-term strategies need to be prepared, as the trend increasing from year to year (Gani et.al, 2013).

Direct impact of logging activities related to revenue to the state government in the form of premium, royalty and cess. The associated damage to forest and wildlife are the indirect impacts. Forestry department cooperates with other state departments in the enforcement of forest law. Some of the animals get benefits from these activities, such as elephant, sprouting and regeneration of the new plants in logged forest. While, the small animals are affected. The presence of mammals in unlogged forest are higher than logged forest (Jamhuri et.al, 2018). Due to logging activities, the populations of carnivores are decreased due to habitat fragmentation and hunting. However, hoofed mammals such as deer can endure these activities by taking advantages of the variety of fruits, forest and non-forest plants. But still they would not be surviving for a longer period. The lack of large trees in these areas is likely to impact the survival of mammal species from the forest, since they provide animals and their predators with habitat and food resources. Unlogged forests are characterized by a high level of complexity in vegetation that provides a heterogeneous habitat for wildlife and increases biodiversity, especially of species that rely on large, mature trees. Also according to the studies, they found that logging forests, even after many decades, did not recover to preharvest levels of biodiversity.

INCONSISTENCIES BETWEEN FEDERAL AND STATE ENVIRONMENTAL HEALTH LAW

I. Food Act And Regulations

Food Act 1983, along with its regulations (Food Regulations 1985 and Food Hygiene Regulations 2009) are the key components of the food health policy under the Ministry of Health and very comprehensive law providing protection to the public against health hazards and addressing wrongdoings. This includes the registration of food premises, conducting food sampling, inspections of food premises, investigating complaints of food premises to make sure that safety standards are maintained. In other words, the purpose of the Food Act 1983 is to safeguard the public against potential health risks and misconduct in manufacturing, packaging, food supply, selling and usage at the level of human use and retail. Malaysia's food safety legislation is being enforced throughout the food chain from farm to table. The function of the Food Safety and Quality Division (FSQD) under the Ministry of Health is to establish an efficient food protection safety system and offers advice and guidance for the food chain through tripartite coordination between government agencies, industries and consumers.

Though the responsibility for food protection lies with the Ministry of Health, other government entities are also responsible for food security in Malaysia. Jurisdiction under the Ministry of Agriculture and Food Industry such as Pesticide Act 1974, Fisheries Act 1983, Veterinary Surgeon Act 1974 and the Animal Ordinance 1953 enforced at the primary production level of raw material for food production. In order to ensure a clearer choice of food labels and improved consumer safety against deceptive and fraudulent labelling of food items, the Malaysian Government implemented the Food Act 1983, the Consumer Protection Act 1999 and the Trade Descriptions Act 2011, in which both were put under the Ministry of Health and the Ministry of Domestic Trade and Consumer Affairs. The individual in control of health inspections shall be "authorized officers" under the Food Act 1983 and shall be described as "... any medical officer or any assistant environmental health officer of the Ministry of Health or of any local authority or any qualified person named by the Minister to be an approved officer under Section 3". EHOs and AEHOs in the Ministry of Health are responsible to carry out more regular

inspection, as analysis examination done by lab analysts appointed by the Ministry of Health, and closure of food premises by EHOs in the local authority. In recent years, the burden and needs of enforcement activities, food inspection and closure of food premises not only entrusted to Food Safety and Quality Division (FSQD), undeniably involvement of EHO, AEHO and District Health Officers from Public Health Program.

Food Control and Safety Unit in the local council is also responsible for preparing, monitoring, and reviewing environmental health practices. This requires the licensing of food premises, the execution of food processing, the review of food premises, and the examination of reports from food premises and the protection of health requirements. Under Section 73 of the Local Government Act 1976, all food business operators are required to register their food establishments with the local authority and all premises are liable for inspection by the EHO. It covers all premises used for preserving, manufacturing, serving or cooking produce. Cooperation and collaboration initiatives between the Ministry of Health and local authorities also played a positive role.

Table 2: Law and Regulations (By-Law) in Local Council Related to Food Safety System

No.	Local Council	Law and Regulations
1.	DBKL (Kuala Lumpur)	Food Act 1983 (Act 281) Food Regulation 1985 Local Government Act 1976 (Act 171) <i>By Law</i> i. Food Handler By-Law (WP) 1979; ii. Local Government (Compounding Offences) By-Law (WPKL) 1986; iii. Food Establishment By-Laws (WPKL) 2017 iv. Trades, Business & Industrial By-Law (WPKL) 1986; v. Licensing of Hawkers & Stalls By-Law (WPKL) 1989
2.	MBSA (Shah Alam)	Food Act 1983 (Act 281) Food Regulation 1985 Local Government Act 1976 (Act 171) <i>By Law</i> i. Food Handling Law (MBSA) 2007 ii. Food Establishment Licensing Law (MBSA) 2007; iii. Hawker Labour Law (MBSA) 2007 iv. Food Establishment By-law (MBSA) 2007 v. Commercial Trade and Licensing By-law (MBSA) 2007
3.	MBI (Ipoh)	Food Act 1983 (Act 281) Food Regulation 1985 Local Government Act 1976 (Act 171) <i>By-Law</i> i. Food Handlers (Ipoh Municipal Council) By-Laws 1981; ii. Control and Monitor of Food Centres By-Law [MPI] 1981; iii. Trades, Business and Industry By-Law (MBI) 2017; iv. By-Law (Compounding Offences) (MBI) (Amendment) 1992.
4.	MPKj (Kajang)	Food Act 1983 (Act 281) Food Regulation 1985

		Local Government Act 1976 (Act 171) <i>By Law</i> i. Trades, Business and Industry By-Law (Mpkj) 2007 ii. Hawkers By-Law (Mpkj) 2007
5.	MDS (Setiu)	Food Act 1983 (Act 281) Food Regulation 1985 Local Government Act 1976 (Act 171) <i>By Law</i> i. Compounding Offenses of Local Government By-Law (Setiu District Council) 1987 ii. Public Hygiene By-Law (Setiu District Council) 1985 iii. Hawker By-Law (Setiu District Council) 1988 iv. Food Operator By-Law (Setiu District Council) 1988 v. Trades, Business and Industry By-Law (Setiu District Council) 1989

MBI, DBKL, MBSA, MDS and MPKj are required to carry out a technical and regulatory inspection, monitoring and compliance on food premises. 'Improvement Notices' are used by local councils to resolve a range of non-compliance in a food company. For instance, urgent solutions for sanitation, repairs or systemic contraventions or hazardous food handling activities should be used. Improvement notices must have a fair timeline for food premises to address any recorded non-compliance.

Local authorities do not investigate any food poisoning or food water-borne illness as listed in First Schedule (infectious disease) which is required to be notified under the Prevention and Control of Infectious Disease Act 1988. Therefore, the notification of food poisoning outbreaks should be reported and investigated by the Ministry of Health (MOH). In local councils, EHOs only examines concerns regarding food safety in food premises and unauthorized food premises such as hawkers' stands, restaurants and others in compliance with the Food Establishment By-law (2007), the Food Handling By-law (2007), the Commercial Trade and Licensing By-law (2007) and the Municipal Government Act 1976. EHO shall prepare for legal action to be taken against the accused. Table 4 shows the review of the work activities in food safety systems by EHO in selected local councils.

Table 3: The Review of Work Activities Conducted by EHO's in Local Council.

Local Council	Work activities					
	Food premise inspection	Food hygiene inspection	Food sampling	Seize	Food poisoning investigation	Health education
DBKL	√	√	√	X	X	√
MBSA	√	√	√	√	X	√
MBI	√	√	√	√	X	√
MPKi	√	√	X	X	X	√
MDS	√	√	X	X	X	√

EHOs are responsible for monitoring, enforcing standards of environmental, carrying out measures including administering for protecting public health. These include food hygiene, any nuisance's complaint, noise and pollution control, preventing environmental health conditions injurious to health and promoting good environmental practices. Health education and promotion are used as

vital tools to promote environmental health or influence the health behaviour and bring about improvements.

Food Hygiene Regulations 2009 was gazetted on 28 February 2009, provides an infrastructure to control the hygiene and safety of food sold to the consumer and protect from food-borne diseases. To achieve goals and objectives, EHOs carry out regular checks on all registered food and beverage establishments to ensure that the public health is protected with high standards and meet legal requirements. Inspections and evaluation of food and beverage establishment's focus on cleanliness, food handling methods, food storage, sanitation of equipment and utensils, toilet facilities, food handlers (vaccinated against typhoid and attended the basic food handling course), waste disposal and management, floors, walls, ceilings and ventilation system. The guidelines on the grading system of food premises in the local authority and standard operating procedure have been approved for adoption by the Ministry of Housing and Local Government (MHLG). Figure 1 shows the examples of Grade "A" accreditation certifications under several local council and Standard ABC accreditation certifications approved by the Ministry of Housing and Local Government (MHLG) for food and beverage establishments.

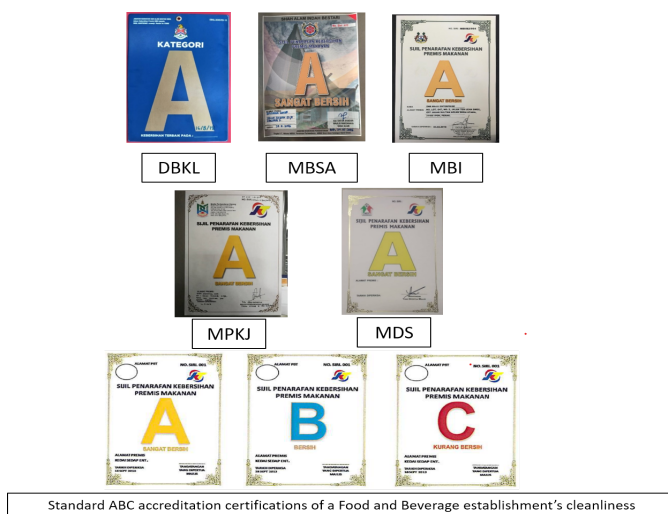


Figure 1: Grade "A" accreditation certifications under several local council and standard ABC accreditation certifications of a food and beverage establishment's cleanliness

Accreditation under the local council classification scheme for food premises also varies from one district to another and often varies in the percentage ranking method norm. In general, grade A is granted to a clean premise that obtains a mark of 86 to 100 percent. Grade B is given to relatively clean food premises with a label ranging between 71 and 85 per cent. Grade C grades are for scores of 51 to 70 points and less than 50 points is eventually provided to the unclean food premises and this premise will be immediately shut down for two weeks. A further review of the premises should be carried out to assess if this premise is competent to manage the business again.

Control of Tobacco Product Regulation (PPKHT) also falls under Food Act 1983. Malaysia officially bans tobacco advertising and sponsorship since the introduction of PPKHT in 2004. Amendment done for Reg. 7 (related to tobacco products as free gift or free gift of other item with purchase of tobacco product) in 2009 and for Reg. 5A (promotion of tobacco products directly or indirectly) in 2013). Smoking in non-smoking designated areas is an offence that is regularly enforced and issued with an offense compound. Others enforcement activities include sale of cigarette in loose packages or loose sticks, sale of cigarettes to persons under the age of 18 (minors or adolescent), sale of cigarettes product without posing health warning, smoking among minors or underage, minors have possession to tobacco product, smoking in food premises, food premises failed to

display no smoking signage, sale of cigarettes without posing health warning, sale of tobacco products online and selling cigarettes product without prior approval. Sale of tobacco products to people under the age of 18 (minors or adolescent) and sale of tobacco products online are subjected to non-compoundable offence, including tobacco advertising, promotion and sponsorship (TAPS). The offenders have to attend a court hearing, sentenced a fine or imprisonment or both. Started 1 January 2019, a ban on smoking at any eating place whether inside or outside building including open-air hawker stalls came into effect in Malaysia. Enforcement of smoking ban includes surrounding eating place and extendable to a radius of three (3) meters from the outer table or chair where eating took place. The number of offenses under The Control of Tobacco Product Regulations 2004 has increased from 35,757 notices issued in 2014 to 57,268 notices in 2018 as in Table 2. For 2018 alone, overall accumulated compound value of RM 3.215 million recorded with 25, 834 compounds were issued throughout Malaysia.

Table 4: Enforcement of Tobacco Products Control Regulations 2004

Year	Notice of section 32B is issued	No. Compound Issuance	Total amount of compound paid (RM)
2014	35,757	17,451	RM1,892,555
2015	35,350	22,542	RM2,067,501
2016	40,965	19,393	RM2,139,661
2017	45,799	23,571	RM2,511,621
2018	57,268	25,834	RM3,215,366

Source: Ministry of Health, 2018

The frequent offenses under Control of Tobacco Products Regulations 2004 include smoking in non-smoking designated areas, the sale of cigarettes to minors (persons under the age of 18), the sale of loose cigarettes packs, the sale of cigarettes without specific graphic health warnings, the smoking offense among minors (persons under the age of 18) and the sale of tobacco products online (internet and mail order). In 2017, the Magistrate of Petaling sentenced RM 6000.00 of fine or 6 months imprisonment against the accused for selling tobacco products through social media. Currently, there are 23 types of public places or non-smoking designated area has been gazetted as smoke-free under Regulation 11, Control of Tobacco Products (Amendment) Regulations 2018. Smoke-free area such as all type of eateries or food establishments, airports, shopping complexes, entertainment centres, elevators, any religious building or public place used for the purpose of assembly, public transport, and any area of government premises. Enforcement of law is intended to make sure the public comply with the law and avoid second-hand as well as third-hand smoke effects among non-smoker or vulnerable population (pregnant women and young children). Furthermore, Sunway Group Auxiliary Police in Bandar Sunway were given a delegate of power under the Food Act 1983 from Director General and trained to enforce the enforcement The Control of Tobacco Products (Amendment) Regulations 2018 within their custody vicinity (Mohd Muslimin, 2019)

II. Vector Control (Disease-Bearing Insects Act)

Millions of people were threatened as vector-borne diseases continued to escalate. Mosquitoes are the species found throughout the tropics and moderate regions and partake almost in the worldwide distribution. Globally, about 1.4 million deaths per year and 17.0% of all infectious diseases were related to mosquito-borne diseases which make it the most important public health problem. There has been a substantial increase in reports of dengue infections in 2019 compared with 2018 and become one of the major problems in urban area. Majority of dengue cases was reported by Brazil, Mexico, Nicaragua, Philippines and Malaysia. In Malaysia, there have been 127,407 cases, including 176 deaths between January and December 2019, this is

higher than the 78,066 cases including 140 deaths reported during the same period in 2018.

Integrated vector control management including legal approach has been implemented in Malaysia as measures to fight vector-borne diseases. Environment management also has been conducted so as to control disease outbreaks towards urban sustainability in Malaysia (Zakaria *et al.*, 2013). Urban sustainability is defined as an ability to support the quality or development of life, or that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. Destruction of Disease-bearing Insects Act 1975 was enforced since 23rd August 1982, intended to provide for the destruction and control of disease-bearing insects. *Aedes* survey was conducted by appointed inspectors during enforcement of the law. Premises were inspected and warning notices were issued to those who possessed *Aedes sp.* larvae in their premises. *Aedes*-positive habitats were significantly higher in urban areas than in suburban and rural areas (Li, *et al.*, 2014). In the urban setting, artificial containers were abundantly located close to human habitation and were potentially more durable than natural containers. *Aedes sp.* found breeds and exploiting stagnant water in man-made containers around the home such as flowerpots, vases, vehicles tires, water storage containers, clogged rain gutters and drums. Communities also tend to store water in containers ranging from flowerpots, flowering can, plastic containers and pail for long periods of time for domestic use. *Aedes sp.* also found utilising outdoor underground collections of water such as septic tanks and storm drains. Humid and poorly maintained gives the perfect breeding place for mosquitoes to produce hundreds to thousands of mosquitoes each day. Adaptation of *Aedes sp.* to outdoor underground structures or collections of water lead to an increase of population numbers therefore difficulty in implementation of control measures (CDC, 2016).

Planned serial 'Aedes Gempur' activities and integrated enforcement operations are carried out simultaneously in time intervals throughout Malaysia with specific operational theme activity, centralised guidelines, field enforcement monitoring and reporting. Throughout 2018, a total of 13 serials 'Aedes Gempur' were conducted including week-long intensive 'Aedes Gempur' operation in August.

Table 5: Enforcement of Disease Bearing Destruction Act 1975

Year	2014	2015	2016	2017	2018
No. Checked Premises	5,419,476	6,167,767	5,502,748	4,623,927	4,688,302
No. Positive Breeding Premises	79,863	98,565	116,862	122,927	119,418
No. Compound Issuance	25,095	18,298	18,017	24,450	21,370
No. Premises Closed	243	416	314	196	120
No. Court List Case	2,414	1,585	1,885	1,867	2,599
Court penalties (RM)	318,242	902,700	1,293,140	1,800,560	3,130,300

Source: Ministry of Health, 2018

In 2018, the total number of inspected premises showed an increase while number of positive premises harbouring mosquito breeding showed a slight decrease. Public Health Policy emphasized that the repeat offenses harbouring mosquito breeding on the site of

the premises is no longer offered for compounding and directly being prosecuted in court.

Point of Entry

While diseases have a potential to cross borders, International Health Regulations (IHR) is the international law used to provide a public health response in handling public health occurrences and emergencies. It comprises of legal framework that defines countries' rights and obligations to control, prevent and protect against any potential spread of disease cross the borders. Outbreaks and public health risks or disease are often unpredictable and a range of responses are legally binding in ways that are commensurate in order to avoid interruption with international travel and trade. The International Health Regulations (IHR) aim for active international collaboration for effective implementation and avoid any emergence or re-emergence of international disease threats. Historically, it has been first adopted by the World Health Assembly in 1969 which primarily only covered six "quarantinable diseases" to reduce to three (yellow fever, plague and cholera).

Today, application of IHR (2005) is getting wider and not limited only to certain specific disease, emergence or manner of transmission. The IHR (2005) encompass any illness or medical condition which could present health or safety harm to humans irrespective of origin or source. In the face of the ongoing disease and virus's evolution over the time, the provisions in the IHR (2005) have been updated at all time to establish rules, improved detection and responses to stop them from spreading among WHO's Member States. Surveillance through obligations series of health documents including certificates applicable to international trade and transport such as 'Ship Sanitation Control Certificates' or 'Aircraft General Declaration', and also requirements for international ports, airports and ground crossings such as international certificate of 'vaccination' or 'prophylaxis' for travellers (World Health Organization, 2007).

Main purpose of IHR at points of entry is to reduce-eliminate sources of infection, contamination, spread of disease and protect travellers and population at ports, airports and ground crossings terminal and also in aircrafts, ships and ground vehicles. State agency or national structures are placed at designated points of entry based on their core capacities and functioning. Capacity in place for surveillance, reporting, notification, verification, response to emergency and other collaboration activities such as limiting unnecessary health-based restrictions on trade and travel important for early detection of violation and containment at source. IHR implementation at ports, airports and ground crossings needs integrated cross – border collaboration, maritime sector and air sector to synergies in public health interest. Public health activities at points of entry includes:

- i. Risk assessment - fostering capacities in inspection, assessment and notification, getting information and verification, and early detection of relevant health risk or events.
- ii. Risk management - Routine control of "sanitary conditions" such as vector surveillance and control, ship and vessel sanitation control, and infection control such as vaccination, prophylaxis and related certificates. Provide WHO Certification for IHR of capacities at airports and ports
- iii. Event management - Support for investigation and preparedness capacity development to emergency response, embrace contingency plans and adopt control measures to abolish public health emergencies.
- iv. Foster international collaboration in a multi-sectoral approach, coordination between WHO and other Organizations.

IMPLEMENTATION OF NEW LAW

I. Implementation Of Electrical And Electronic (E&E) Waste Management.

Rapid economic growth in the region, together with rapid urbanization, has significantly increased the usage and production of electrical and electronic (E&E) appliances (Shumon *et al.*, 2014). Among the developed countries such as Japan, Europe, and the USA, strict legislation and initiatives have been undertaken for the proper management of Waste of Electric and Electronic Equipment (WEEE). In Malaysia, this stage is in early phase as much as management of WEEE is still concerned. DoE had identified whole WEEE units as e-waste. However, the e-waste contractors that were appointed by DoE did not process the waste which is considered as e-waste. In many cases of E&E manufacturing, production of e-waste is not measured as whole units of WEEE, but rather taken as disassembled components (e.g., plastic fittings, chipboards, metal parts, cables, etc.), which are then collected by these contractors (Department of Environment, 2009).

The program for collecting and handling e-waste in Malaysia has not yet been well developed. E-wastes can theoretically be systematically recycled by three recycling systems: voluntary agencies, suppliers, and retailers. In Malaysia, these structures are to take on a shape similar to those in developed countries and it is also beginning to take place in Malaysia; however, only a few manufacturers and retailers have joined in this initiative recently. In addition, the efforts conducted by the Government and other approved organizations are badly organized and constrained, whilst other interventions cannot adequately guarantee the final and efficient handling of e-waste. Collection systems and procedures are very insecure. Besides that, there is no proper market for finished products resulting from recycling (Tengku and Adeline, 2011). Due to the lack of staff (enforcement officers) and communication (support) among workforces (especially from other government sectors), enforcing the law can be the main issue, which leads to potential major weakness of the current e-waste management system (Shumon *et al.*, 2014).

Toxic elements in e-waste such as lead and lithium can be released to the environment due to improper disposal, which are commonly mixed together with domestic solid waste. As a result, these elements contaminated the soil as well as underground water sources, even to air as toxic fumes when burned. Health effects vary according to elements involved such as respiratory failure, nervous damage and even cause cancer (Tengku, *et al.*, 2011). Improper recycling of e-waste can release Hg into the environment in its elemental form of vapour. Bacteria that turn inorganic Hg into organic form in water bodies (i.e., methylmercury [MeHg]) And MeHg are bio accumulated in fish. MeHg contaminated fish feeding is the primary route of consumption in the general population (Azad, *et al.*, 2017).

In Malaysia, the publication of the 2005 Regulations on Environmental Quality (Scheduled Wastes), which replaced the 1989 revoked Environmental Quality (Scheduled Wastes) Regulations. In the latest regulation, e-waste had identified as a scheduled waste listed under the code SW110, while the specified e-waste, such as lead-acid battery waste, heavy metal batteries, and fluorescent lamps, is listed under code SW102, SW103, and SW109 respectively. Because of this classification, any e-waste treatment is limited and must be conducted at an approved on-site treatment facility, and e-waste disposal must be done at the only specified premise, Kualiti Alam Sdn. Bhd. As Malaysia is one of the members to the Basel Convention, it is strictly prohibited to export or import e-waste (Suja, *et al.*, 2014).

II. National Cleanliness policy

The National Cleanliness Policy is a holistic and integrated approach through the concept of Blue Ocean Strategy (BOS) between

ministries, agencies, NGOs and the public. Malaysia is targeted to be one of the cleanest countries in the world and free from infectious diseases while focusing on better waste disposal and clean environment.

Through establishing this policy, there are 9 visions of these National Cleanliness Policy (*Dasar Kebersihan Negara, 2019*) :

1. Changing the behavior and mindset of the community regarding aspects of their self hygiene, family, community and environment.
2. Increasing the level of National Cleanliness
3. Reducing environmental pollutions
4. Reducing waste to be sent to disposal site & increase the rate of recycling.
5. Decreasing the cases of vector borne diseases.
6. Enhancing the quality & worker's skill in the hygienic sector.
7. Enlarging the active involvement of community, NGOs, and private sectors in programmes and initiatives that are done.
8. Strengthening the governance management of solid waste and public hygiene.
9. Reducing in government funds for management of solid waste & public hygiene.

Through the introduction of these policies, practitioners especially those from the background of Environment Health can gain benefits, by reducing their workload. This method can be expected by minimizing the amount of waste generated by the community as well as reducing vector borne disease cases such as dengue and leptospirosis especially in urban settings. Besides that, an effective collaboration between EH staff and community, especially the residents can be built, thus the importance of environmental care can be achieved. These would involve a proper health education and knowledge provided by the practitioners to the community, as they try identifying and combating factors that may become an issue for the poor environment. Improper domestic waste by residents from apartments and lack of garbage disposal facilities are example issues faced by the community. In case of vector borne disease of dengue, it is shown in previous studies that Aedes mosquitoes tend to be highly related in areas with improper housing conditions, poor or unhygienic system surroundings, low income and vector control availability (Ghani, *et al.*, 2018). By identifying these factors on the hotspot area, effective mitigation and preventive measurements can be adapted as part of the cleanliness policies. The National Cleanliness Policy emphasized on 5 main core areas:

1. Establishment of National Cleanliness Policy.
2. Establishment and adopt a National Cleanliness Index.
3. Expanding the implementation of solid waste management and public cleansing as provided under the Solid Waste Management and Public Cleansing Act 2007 (Act 672) throughout the country
4. Banning or limiting the use of plastic bags and containers.
5. Declaration of the National Cleanliness Week and hold a celebration every year.

Extended Producer Responsibility (EPR) strategy implemented to manufacturers that utilized any plastics packaging will be imposed a small fee for it so that they will reuse the bottles for their packaging (Yusof, 2019). Other adaptations to this policy may include promoting a culture of recycling to source of income (waste to money), which also side with the country's initiative to implement Sustainable Development Goals (SGD) 2030.

CONCLUSION

Law enforcement is one of the important aspects in dealing with maintaining environmental health around us. Authorized officers or enforcement officers consist of Environmental Health Officers (EHO), Assistant Environmental Health Officers (AEHO), and Public Health

Assistants (in particular laws only) are responsible for improving the environment and protecting human health. By focusing the enforcement of existing laws, extraction of earth natural resources such as bauxite and logging can be controlled, with minimum risk dealt to the environment. This includes implementation of new rules regarding e-waste which involve parts of unused electronic components that may induce toxicity if no proper disposal is practiced. Therefore, well planning and act is necessary, either governmental or non-governmental, community or individual, to be included as well, in order to achieve proper management methods. To ensure the effectiveness of the current law, procedure and implementation of environmental health related laws (Destruction of Disease-bearing Insects Act and Control of Infectious Disease Act) should be reviewed as well from time to time, so that it will be appropriate when dealing with current issues and situation on nowadays as well as for the future. Any flaw within the law should be assessed as well. Besides that, enforced personnel such as EHO and AEHO should be provided with its proper jurisdiction and fits in with the right ongoing cases. Other suggestions include reforming the environmental health law unit under ministry level, with registered Environmental Health Practitioners, suitable allocation budget so that any activities can be taken efficiently and effectively.

CONTRIBUTION STATEMENT

MAEH Focus Group Discussion 2020 was held via teleconference from 25 June - 25 July 2020. MRB, NNAZNAR, MMAK, TAST, MRBK and FAS conceived the forum and drafted the first version of the discussion. NCD, MRR, LPL, NAS, SSZ and NHM analysed the topic. All participants produced the article and approved the final version.

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Environmental Health Delivery for Developed and Developing Countries

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INTRODUCTION

Environmental health delivery practice is focused on assessing, controlling and preventing factors in an environment that can potentially harm human health and sustainability. It involves many professional disciplines, organization, people and actions that primarily intend to promote, restore and sustain health. However, the impact of environmental health delivery among developed and developing countries varies. Basically, countries are divided into two major groups; the developed and the developing countries. Country classification is based on economic status such as Gross domestic product (GDP), Gross national product (GNP), per capita income, industrialization, living standard etc. (Surbhi, 2020). Developed countries, as opposed to other countries, are defined as sovereign states which are stable in terms of economy and possess advanced technologies and infrastructure. However, countries with low industrialization and low human development index are considered as developing countries (O'Sullivan et al., 2003). Instead of economic differences, there are also inequalities in health deliveries.

DEVELOPED VS DEVELOPING COUNTRIES

Developing countries suffer from high rates of diseases especially infectious diseases and malnutrition; poor food, unclean water, poor sanitation and shelter level, inadequate treatment and lack of sufficient medical care (Orach, 2009). A study reported the global effects of the Spanish flu pandemic found that there was a significant gap in mortality rates between the developed and developing countries (Oshitani et al., 2018). There are several factors involved including lack of access to sufficient medical care, poor public health infrastructure, socioeconomic status (SES) such as housing conditions and number of populations, and host factors such as nutritional status and co-existing health status. Therefore, mortality rate is greater in developing countries compared to developed countries. There are

surveys that evaluate around 180 countries on their environmental health and vitality of their ecosystems which uses the term Environmental Performance Index (EPI). European countries dominate the top ten in this survey focusing on sustainability around the globe. This survey intends to establish and point out where work is required and advise policy-makers. Going through the EPI rank of countries from first until eleventh are all European nations and having to go down to number 12, which is Japan to leave the continent shows how much progress has been done in European countries on addressing environmental health issues (Arbolino, 2018).

There are a number of environmental health delivery components. However, in this paper we are focusing only on four major components which are communicable disease control, water safety, sanitation/solid waste management and air quality. Figure 1 shows the environmental health deliveries framework among developed and developing countries.

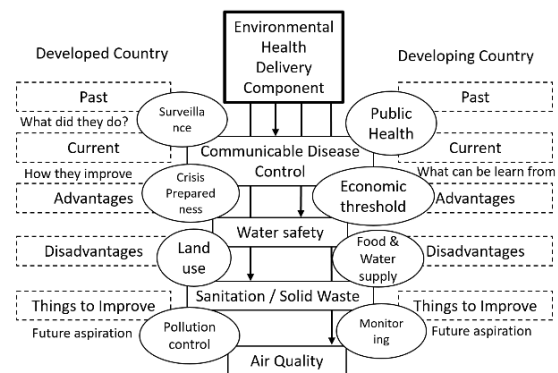


Figure 1: Environmental health deliveries framework

The past and current environmental health delivery practices, advantages and disadvantages of current practice and future improvements for each component for both developed and developing countries shall be discussed further.

Communicable Disease Control: Past

Communicable Disease Control is part of the Environmental Health component related to Public Health. Looking back in history before the Covid-19 pandemic hit, the world has been struck by numbers of major communicable disease disaster involving the environment naming a few smallpox in Athens, Greece, The Plague of Justinian, Great Plague of London, Smallpox in Mexico, Yellow fever in Philadelphia. Even though disease figures change regularly, infectious or communicable diseases stay in as the prominent cause of morbidity and mortality in least developed and developing countries.

South East Asia (SEA) zone contributes to high mortality rate from infectious disease related to the environment (WHO, 2018). Singapore is the only developed country in South East Asia. Most developing countries especially in SEA region have fall short to eradicate vaccine-preventable diseases even with the provision of interventions and policies to prevent them in the past few decades. Joint effort of developed countries and developing countries on this mutual goal of health determinants has been seen in "Millennium Declaration" which was signed by 189 countries and the aim for the goal run for period 2000–2015. Five out of eight goals in this collaboration's concern are on the environment and health (Pimonenko, 2018). Optimal control of communicable disease depends on control measures in the environment, surveillance program, policy and regulation, vaccine and medication and behaviour change (Bagherian, 2017). In terms of surveillance programs, developing countries assess epidemiologic communicable disease control conventionally rely on interview-based and incident data for contact tracing and to evaluate key epidemic criteria that are very basic and effective data such as demographic data, time and place. Nonetheless these data can be limited by incomplete information input due to labour-demand constraint. Least developed nations are also short of disease surveillance programs and laboratories, which are important to the purpose of diagnosis and findings which contain communicable diseases.

As a developing country, financial affairs are the most fundamental concern for sustainable interventions. As infectious diseases can exhibit epidemics in the present economic context, it is to conclude how funding allocations essential for the prevention, control and treatment of communicable diseases (Abel-Smith, 2018). Prioritization is critical in managing infectious disease. Vector-borne infectious diseases, particularly mosquito-borne, pose a substantial threat to populations throughout South and SouthEast Asia. In the early years of the 21st century, outbreaks such as Chikungunya and Dengue have affected these regions several times. These diseases are believed to be highly prevalent at endemic levels in the region as well (Servadio, 2018).

Communicable Disease Control: Current

Control of communicable diseases remains as one if not the most major public health priorities globally. Moreover in this prosper information sharing era, media interest and public expectations is high in terms of public health assurance, and environment. In Malaysia, dengue fever is the most prevalent infectious disease followed by Tuberculosis (TB), Hand Foot and Mouth Disease (HFMD) and diarrhoeal disease or food poisoning. Compared to the neighbouring country, Singapore the most prevalent infectious disease is HFMD, followed by dengue fever and diarrhoeal disease. In Denmark, foodborne disease like Salmonellosis has been eradicated since 2011.

Developed countries have a well-established surveillance system. Influenza like illnesses (ILI) is an example of a symptom to

be recorded in a surveillance system and the benefit with this established system is that: risk assessment can be done with early detection of disease. Even if the developed countries have a good surveillance system they are still improving because communicable disease is dynamic in terms of time, people and place.

While the developed country uses advanced technology to study specific genotype of pathogen that causes a certain infectious disease, it is too ambitious progressively for developing countries to jump into the bunch in the near future as there are few more demanding and critical factors to refine such as better environment control, enhanced surveillance program, behavioural change and medication as well as vaccine and drugs availability.

Various aspects to determine whether the least developed nation and whether the developing too are able to access affordable drugs are being researched. In terms of medication availability, most medication research and development are not tailored towards the need of the community in poor nations because they are not a big market (Obi, 2017). Therefore, a large portion of the fund spent comprehensively on infectious disease and health related research are committed to infectious disease issues involving a small chunk of the global population. Another factors affecting are the social and political challenges to the distribution of medicines. Multi-government, founder, pharmaceutical body, and other organizations are conducting attempts to tackle this issue contributing fund, research, and medications donation. The World's infectious disease affliction is not concerned on loss of lives or damaged but whether most of these infections could be stopped or prevented efficiently with cheap medications or drugs.

Vaccination and treatment linked into control policies are interventions which become a highly practical advantage and also ease implementation as they are widely applied and proven to control or curtail a disease (Kumar & Srivastava, 2017). Besides the needs of the basics of life like water supply, sewage management, food safety improvement, proper vaccination programs are needed crucially in least developed and developing countries. Life expectancy gap between the wealthy and the poorest nation now widens and transcends approximately four decades (Elmawazini, 2019). Vital and major obstacle to accomplish this enhancement is the elemental shortcomings of the competency in terms of health care and environmental health personnel. Environmental Health Officers (EHO) in a developed country academic qualification are at a bachelor's degree level while in developing countries EHOs are signed up at diploma levels. Qualification plays an important role in communicable disease control activities at the field of investigation, specimen taken and control activities. To address this concern, environmental health and public health infrastructure are needed. Leader and officer developed a strategy to improve health literacy for the public and also for the health professionals' education to gain education opportunities specifically to the EHOs.

Water Safety: Past

Burden is significantly put towards the developing countries, with the resource constraint and limited technology. According to WHO in 2015, there are 2.1 billion people globally still lacking on safe water at home, which included 844 million people with no basic drinking services and 159 million people still dependent on untreated surface water. The situation is most common in sub-Saharan Africa and Oceania region (WHO, 2017). The increase of lack in water safety is also accountable for increases of water-borne diseases especially diarrhoea among children, where 829,000 people are estimated to suffer each year from diarrhoea due to contaminated drinking water, sanitation and hygiene (WHO, 2019). Thus, it remains the core priority in Sustainable Development Goals (SDG) to ensure that all have access to at least basic level of services.

Before these countries achieved universal basic drinking water services, they also underwent a series of diseases outbreaks and water

contamination due to use of untreated water and no installation of sewerage systems. However, the facilities and treatment began to improve by years. In 2004, WHO also introduced international guidelines of water safety plans (WSPs), where 93 countries had implemented it but with a variation of scale-up implementation (WHO, 2017). However, not all developing countries are able to implement the framework with the same pace as developed countries. Some of the developing countries are still struggling with basic provision of water and use of untreated surface water. Thus, current practices in the developed countries may vary compared to developing countries, since they have different concern areas and resources.

Water Safety: Current

Meanwhile, in most developed countries such as Australia, New Zealand, North America and Europe are close to achieving universal basic drinking water services, gaining access to water supply and sanitation (WHO, 2017). Thus, it makes water security as no longer the issue for most of the developed countries. However, they are still dealing with issues that affect drinking water quality such as water scarcity, drought and water pollution due to rapid urbanization and climate change phenomenon.

There are certain areas in developing countries that still do not have proper water treatment and sewer systems. For a community that lacks potable water supplies, home-storage water is a common practice by collecting from surface water such as rivers, lakes and boreholes. Even if there is pipe water supplied to the home, it is not always constantly accessible, thus there is a need for home-water storage. Contamination during collection, transport and storage of water due to poor hygienic practices can lead to health problems among the household (Edokpayi et al., 2018). Decentralized approach such as focusing on household water treatment and sanitation facilities are the most suitable alternative for developing countries, since that centralized approaches are always associated with high maintenance expense, lack of proper management and reliance on treatment technology that need to be sustained frequently (Montgomery & Elimelech, 2007).

Meanwhile, for household sanitation, these countries still lack a proper sewage system and disposal. The gaps between rural and urban areas in sanitation practices is still high, where urban households are proved to use the improved sanitation facilities, compared to people in rural areas. There are still some households in rural areas that have no access to sanitation facilities and practice defecating in the open. The likely reason for urban people to have more access to these infrastructures is due to availability of central sewer systems only in major areas of cities but not in remote areas (Abubakar, 2017). The distinct difference in availability of proper water treatment and sanitation facilities in developing countries can be seen as challenges of implementing the infrastructure due to lack of financial resources; incapability in operation and maintenance the facility; lack of water quality standards; insufficient skilled personnel and monitoring equipment or technologies (Montgomery & Elimelech, 2007).

Sanitation / Solid Waste Management: Current

Due to growing growth, rapid economic development, increase in the consuming pattern, rapid urbanization and global industrialization, solid waste practice has become a global issue in developed and developing countries (Ferronato & Torretta, 2019). Anthropogenic activities produce waste and it is the way in which waste is treated, processed, collected and disposed, which can pose environmental and public health threats. Statistics in 2016 showed the cities around the world produce 2 billion tonnes of solid waste, leaving a footprint of 0.74 kg per person per day. Total waste production projected to rise to 3.4 billion tonnes by 2050 despite rapid population growth and urbanization (The World Bank, 2019).

At present, the most effective strategies to waste management worldwide is focused on three R concept: Reuse, Recycle and

Recovery (Di Maria et al. 2018). It has been extrapolated from the waste management hierarchy framework. Figure 2 shows a basic principle that is related to waste management: prevention; reuse; recycle; recovery; disposal.

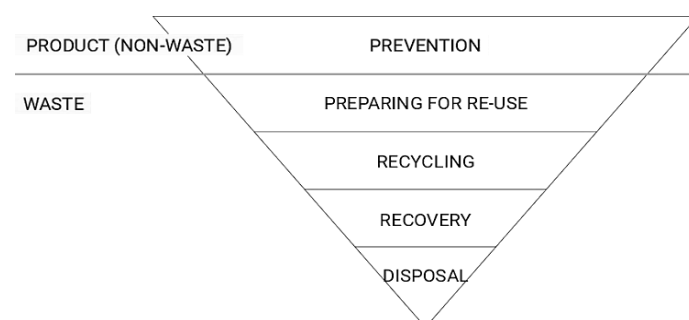


Figure 2: Waste Management Hierarchy Framework

From this framework, it helps to determine when waste should be treated as a secondary raw material and allows stakeholders to distinguish between waste and by-product. Plus, it illustrates principles of waste management, demanding that the waste is to be handled without endangering human health or the environment and which focuses on waste prevention.

Population in developing nations, particularly the urban poor are more highly affected by mismanagement of solid waste compared to those in developed nations. The use of effective treatment and disposal technologies is still scarce in most developing countries. In general, they used obsolete methods and disposal techniques, inadequate and inconsistent monitoring of collection and facilities, lacking political attention and human resources. Other issues are insufficient public awareness on effective waste management practices, lacking household-level recycling programmes, inadequate handling and monitoring of scavenging activities and lack of organization capacities, skills, expertise and financial resources. In contrast, developed countries effectively resolved issues related to solid waste management by introducing effective policy framework and well-engineered technologies and methods for waste management. The differences between developed and developing countries can be seen in Table 1.

Table 1: Differences in solid waste management in developing and developed countries.

Solid waste (WS) criteria	Developing Countries	Developed Countries
Collection, transfer and transportation of SW	- Insufficient and ineffective, leading to inadequate waste collection system - Lack proper waste collection - Road in bad condition/ inaccessible - Financial constraint to buy equipment and machinery	- Proper bin collection systems, effective and efficient route planning and access to information on collection schedule - Infrastructure well developed - Full and latest equipment and machinery
Processing and treatment of SW	- Adopt biological treatment, thermal conversion and material recovery and recycling - Application of vermi-composting is still low or absence - Used of incineration with emission of harmful gases to public health and environment - Low or absence of recycling system	- Deployed advance thermal combustion methods such as pyrolysis and gasification. - Deployed vermi-composting facilities to process organic waste - Used advance technologies that protect public health and environment - Effective recycling system
Technology of SW management	Employ relatively cheap technologies (landfills)	State-of-the-art waste management technologies (thermal treatment, sanitary landfills)
Government policy	- Lack of enforcement and implementation - Lack of proper organization structure	Stringent regulation and legislation

Source: Mmereki et al. (2016)

Developed countries have developed and implemented effective solid waste management framework, adopted sustainable waste

management technologies and integrated approaches compared to developing countries. In developing countries, traditional solid waste management practices remain dominant. And until today, the developing countries are still struggling to deal with solid waste management.

Air Quality: Past

Air pollution is nothing new. In fact, it has become one of the most significant challenges faced by humankind since the beginning of industrialization. Before developing successfully in cutting their carbon emission, they experienced a series of air pollution events mostly in the 18th to 19th century due to the Industrial Revolution and use of coal as energy resources to help nations run and manufacture goods. However, over century burning coal from home fires and local factories had caused deathly smog over London town in 1952. As a result, it killed nearly 4,000 people over several days of event. The Great Smog of London and other several air pollution events had been an initial point for developed countries to monitor their air quality and control the carbon emissions (Polivka, 2018).

Air Quality: Current

Malaysia is moving towards being a developed nation in terms of air quality. This is reflected from the setup of the network monitoring station. Similar to communicable disease, air quality surveillance systems are important to manage early warning systems which detect uncontrolled release of untreated chemicals on air. The common issue in Malaysia is odor-related pollution. The tolerability of urban people towards odor is low. The Department of Environmental is developing an odor-related emission level which formulates odour level for the public to address the level of pollution.

However, with the series of pollution events that occurred, most developed countries had developed a robust framework and policy standards on air quality performance. Countries such European Union (EU) had way surpassed their targeted emission reduction and had led to extensive approaches in seeking to invest on alternative energy and sustainable development (EU, 2018).

Meanwhile, low- and middle- income countries had suffered the most from air pollution both ambient and indoor air pollution. According to the World Health Organization (WHO), there are approximately 7 million deaths every year from air pollution and regionally occurring in Asia and Africa. In 2016, ambient air pollution accounted for 4.2 million deaths alone, while indoor air pollution caused around 3.8 million deaths in the same year (WHO, 2018). The cause of air pollution in low-middle income countries are mainly due to intensification of the industrial sector, rapid urbanization as well as transportation. However, the rapid development in developing countries tend to jeopardize their quality of life over the desire for industrialization. As a result, some areas in developing countries tend to overlook for example dealing with air quality management.

Intensification of the industrial sector in developing countries may have been the result of foreign manufacturers that are sited in developing countries. As a result, from weak environmental standards implemented in developing countries, it attracts foreign firms to establish their production there. Therefore, causing heavy pollution to the host country. Basically, these foreign countries were improving their own environmental performance by shifting to a less-polluting way and transferring more polluting activities to developing countries (Zhou, 2017).

Furthermore, low- and middle- income countries often execute poor urban planning like waste disposal and treatment. Countries like Cambodia, Thailand, Nigeria and Mozambique had been manifesting unsustainable waste management practices such as open dumping, open burning and informal recycling which creating environmental health hazards. Correspondingly, toxic fumes and smoke from open

dumping and burning have degraded environmental air quality in these countries thus affecting public health (Ferronato & Toretta, 2019).

Another principal course of air pollution is from rapid motorization in highly populated areas. Developing countries consist of a high density of population due to rapid migration into cities, with poor transportation networks such as rapid urban transit, cycling and pedestrian lane. Thus, resulting in heavy reliance on diesel-fuel vehicles to enhance mobility (Sperling, 2002).

Moreover, developing countries recorded a high number of deaths due to indoor air pollution. Women and children in the countries suffered the most from indoor air pollution as a result of not being able to purchase modern technologies such as electric stoves. Increased poverty had resulted in high use of charcoal, firewood and kerosene inside poorly ventilated homes for cooking, heating or lighting (WHO, 2018).

Table 2. Comparison in Environmental Health (EH) Delivery between Developed and Developing countries.

DEVELOPED COUNTRY	EH SERVICES	DEVELOPING COUNTRY
-Established epidemiology surveillance -Eradicated Vaccine Preventable disease (VPD) -Establish drug R&D, available and affordable -Funding allocations to certain disease prevention program are sufficient and prioritize accordingly	Communicable Disease Control	-Strengthening epidemiology surveillance -VPD are still exist in the community and are not been eradicated completely -Most drug R&D is not geared toward the needs of people in less developed countries because they are not a big market. -Funding allocations to certain disease prevention program are insufficient and does not meet the need.
-Safe water supply, advanced sewage treatment and disposal, improved water monitoring. -Centralized approach is the most suitable alternatives especially for remote areas. -Invest on advanced technology for efficient operation.	Water Safety	-Basic sewage treatment and disposal while some area still use conventional method -Decentralized approach is effective in most part of the countries. -Inadequate technology for water treatment and sanitation.
-Eradicate foodborne disease without vaccine	Food Safety	-Still does not eradicate any foodborne disease with proper vaccine
-Target is to reduce greenhouse gas emission is achieved but proceed toward carbon net zero emission (climate change) -Effective household segregation	Air Quality	-Does not enforce air pollution matter because of interest
-Well developed Infrastructure and advanced equipment and machinery	Sanitation / Solid Waste Management	-Lack of household segregation -Financial constraint to buy equipment and machinery

As a summary, there are differences in environmental health delivery practices between developed and developing countries in terms of communicable disease control, water safety, food safety, and air quality and sanitation/waste management.

FUTURE OF ENVIRONMENTAL HEALTH DELIVERY BETWEEN DEVELOPED AND DEVELOPING COUNTRY

Teaching Program

Environment health issues between developed and developing countries are coming to meet a common point where there is a traditional environmental health risk and modern risk. Developing countries such as Malaysia are indeed facing environmental health issues stemming from the imbalance of infrastructure development and globalization. However, for developed countries, environmental health issues are mainly related to globalization and technologies development. EH professional staff are required to address environmental health issues in both developed and developing countries. To achieve this objective, a dynamic environmental health curriculum is needed to highlight issues of programmatic enhancement and to evaluate EH professional competencies (Arshad et al., 2018), which considers the geographic and demographic aspects of a country as well as globalization with the context of advanced technology. The dynamic curriculum must be accompanied by EH educators who specialized in the field that incorporated advanced and low-cost technology and have strong skills in determining effective teaching and learning approaches in line with the IR 4 or AI

technology in implementing teaching and learning based on blended or hybrid learning concepts.

In addition, a robust and ideologically oriented training course EH along with a one-year dynamic training module must be designed rather than in-service training concept that is only implemented periodically. The potential topics of knowledge and skills are important to provide a framework for curriculum analysis and to evaluation of existing programmes to prepare EH personnel in the coming years and even beyond (Arshad et al., 2018). With this kind of training, EH instructors will be able to function efficiently in producing professional EH personnel to manage environmental health issues in developing countries especially in Malaysia. Therefore, environmental health issues in developing and developing countries should be managed wisely by professional EH personnel.

Communicable Disease Control

Getting back to the main component in providing the ideal communicable disease control program is towards advancement in environment control via well trained personnel and equipment, enhanced surveillance program, behavioural change and medication as well as vaccine and drugs availability. Although policy and regulation are important, having a decent policy without a good spectre of enforcement and compliance, will turn out to be inadequate. Risk communication is the area that both developed countries and developing countries need to operate comprehensively. For instance, comparing the policy and risk communication of Malaysia and Italy during the covid-19 pandemic. Malaysia deals with the situation relatively prominent by the early movement control order. Also relating on the covid-19 the lesson learnt is even though the country possessed the most advanced technology in the world like the United States and China, a simple policy and efficient risk communication to the community are essential in dealing with communicable diseases.

Water Safety

Overcoming the barrier of delivering safe water provision and sanitation in both developed and developing countries, requires all participation from the top management of government to general involvement of communities itself. In order to have clean and safe water, the government prioritizes improving access to water supply especially to remote areas. However, increased access to water does not always ensure its better use, if water-borne disease is still increased along with the poor hygienic practices among the society. Thus, indicating the need to have public education in sanitation and proper hygienic practices.

There is a need to emphasize on educating society to identify the negative impacts of improper water treatment and inadequate sanitation along with policy implementation. Better cooperation between the community members can be gained through the rising knowledge on the importance of water safety, sanitation and health. Besides, government initiative should focus on the needs and capability of the local community to conduct the operation and maintenance. The operation work required trained and skilled personnel to be in charge of the provision of water safety and sanitation along with the availability of equipment and technology. Lastly, collaboration between governments with international stakeholders in adopting systems worked by developed countries along with the financial resources assistance and trained manpower can help towards an efficient implementation of water safety and sanitation services.

Sanitation / Solid Waste Management

The best strategy to promote and enhance solid waste management in developed and developing countries is to ensure that all parties actively participate in this process. The key objectives of the strategy are to increase knowledge of solid waste management to

all members of the community (Mmereki, 2016). Participants will join the campaigns if dissemination of the information on the importance and advantages of waste management programme on how to handle waste and engage in designing of the programmes is implemented. Continuous public education can be delivered through all communication channels such as television, radio and newspaper. Social media platforms such as Facebook are powerful to educate and influence the public. Active public participation towards successful delivery of effective programmes is critical in all countries.

Air Quality

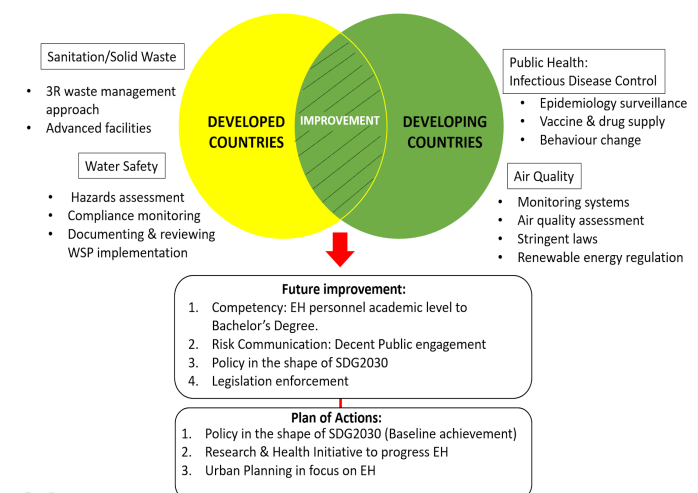
Developing countries are majorly involved in heavy industrialization and had been major contribution to urban air pollution within the countries, the first step should be on developing air pollution standards. For example, emission standards for vehicles and industry can be established in accordance with partnership parties. Improving fuel quality or adopting clean energy is important to meet the vehicles emission standards policy. The use of recent technology such as portable multi-gas analysers for EH personnel are highly needed. Smartphone application to link community to Environmental agency such as DOE should be introduced in Malaysia.

Collaboration between government and other interested parties in developing clean energy transportation or technology is important in promoting environmental-friendly life. At a state level, public transport and a non-motorized vehicle should be promoted for better air quality. Society should be educated in the importance of environmental protection and reduction of transportation emission. Concept of environmentally sensitive urban development should be educated in workshop training for industrial, media and learning institutions. In addition, extensive informational campaigns and awareness-raising projects should be widely disseminated through social media platforms.

Plan of Action

On the whole, both developed and developing countries demand for future improvements in environmental health delivery is needed. Figure 3 illustrates the framework of environmental health delivery for a better future.

Figure 3: Ad-Libitum Attribute of Environmental Health Delivery for a better future.



Referring to Figure 3, the Plan of Actions involved are collaboration between all sectors including government, privates, NGOs and community to participate in urban planning to help cities mitigate current and expected risks to environmental health, research and health initiative including technology innovation to promote public health and environmental and health initiative through continuous education and programmes. Communication tools such as

the use of social media as a communication platform will drive environmental health delivery to the next level.

CONCLUSION

Environmental health delivery in low- and middle- income countries are still climbing to its top. For instance, countries like sub-Saharan Africa and South East Asian regions are still striving in public health, waste management, water safety and air quality. Largely due to a burden from the nation's gross domestic products (GDP), thus it explains the diversion of goals between developed and developing nations. As developing countries desire for industrial and economic growth, they tend to jeopardize and sacrifice quality of life such as health and environment through unsustainable development practices. They do not consider investing in proper technology, competent manpower and maintenance of operation since all they care about is achieving the nation's wealth. Burden of the economy triggered the country's inability in investing in modern technology, restricts capacity development in addressing environmental problems and growing the technical challenges.

In overcoming these challenges, countries need to pursue distinctive approaches in each service such as having strong collaboration between government and continuous public education, public engagement and legislation enforcement. Further proper urban planning along with research and health initiative can be an effective way to resolve barriers in environmental services. Furthermore, adopting the framework system of a developed country in accordance with the country's capacity can be the fundamental step in delivering better services. In order to manifest excellence in public health, solid waste management, water and air quality performance requires a strong and holistic approach by the government, stakeholders, academia and community itself.

CONTRIBUTION STATEMENT

MAEH Focus Group Discussion 2020 was held via teleconference from 25 June - 25 July 2020. AFO, NHH, AYY, MHR, RR and FAS conceived the forum and drafted the first version of the discussion. MAZ, HH, MFU, TPA, JH, RMA, AO and MFA analyzed the topic. All participants produced the article and approved the final version.

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Environmental Health Delivery in Malaysia: Staff Competencies and Workloads

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INTRODUCTION

The proliferation of the emerging or re-emerging communicable diseases is one of the issues plaguing mankind. The World Health Organization declared COVID-19 as a global pandemic as the coronavirus rapidly spreads across the world. More than 4 million COVID-19 cases with fatality cases had been detected with more than 200 thousand deaths reported up till 14th of May 2020. The alarming levels of spread and severity of COVID-19 can be seen as a test for healthcare and environmental health delivery. Environmental health practitioners are one of the frontline agencies involved in managing the outbreak. EH professionals form a key component of the delivery system for public health where they are regularly providing support to prohibit significant health effects and to prepare for, react appropriately to, and bounce back from disease outbreaks and natural or anthropogenic disasters (Brooks et al., 2019).

Environmental Health encompasses both external physical, environmental, and biological factors and all related behavioural factors. It involves assessing and monitoring any environmental factors which could possibly impact wellbeing. It is aimed at the prevention of disease and the development of environments which support health (National Environmental Health Action Plan, n.d.). In Malaysia, there is approximately 5,000 environmental health officers (Pegawai Kesihatan Persekitaran) and assistant environmental health officers (Penolong Pegawai Kesihatan Persekitaran) serving in the government agencies namely the Ministry of Health (MOH), Ministry of Housing and Local Government (MHLG) and Local Authorities (LA) (Malaysiagazette, 2020). In general, this profession plays a prominent role in the area of environmental health, and its key duty is to prevent environmental health problems, enhance and secure public health and the environment in the following areas; disease control, hygiene and food safety, housing and environmental health, vector

control, drinking water quality, water sanitation, emergency preparedness and the enforcement of public health law in accordance with the roles and functions as prescribed by the Expert Committee to the World Health Organization (Musoke et al., 2016). EH practitioners are facing some challenges in the context of professional competency and training; efficient workloads management; technology update; and attitudes and perceptions of environmental health professionals. This paper aims to explore and provide overview of environmental health delivery services in Malaysia on staff competencies and workloads they faced.

EFFICIENT WORKLOADS MANAGEMENT

Environmental health sits at the intersection between environmental factors and health impacts. It is concerned with how both the natural and built environment can impact on public health. Assistant Environmental Health Officers (AEHO) and Environmental Health Officers (EHO) also known as the "Health Inspector" is a civil servant responsible for protecting members of the public from disease and investigating hazards to health and the environment in a variety of different locations, and then taking action to minimize and eliminate hazards. Career as Assistant Environmental Health Officers covers aspects of prevention and law enforcement in general health activities such as food quality control and infectious disease control as well as control of vector borne diseases, healthcare workers, international health, environmental hygiene and other related activities.

Environmental Health Officers are also responsible for monitoring and enforcing health and hygiene legislation. They advise and educate organisations on how to meet regulations and make sure that they are enforced. They also investigate when there is an incident, such as pollution, pest infestation or an outbreak of food poisoning. They are likely to spend time in the community they serve inspecting

premises, collecting evidence from incidents and providing advice. Table 1 shows the departments and job scopes of EHOs in Malaysia taken from Service Bills 11 Year 2005 (Malaysia Public Service Department, 2020).

Table 1: Departments and job scopes of EHOs in Malaysia

Department	Job scopes
Disease Control (Communicable Disease, Non-Communicable Disease, Vector Diseases Control)	a. Monitoring and data collection. b. Investigation of outbreaks. c. Control and prevention measures. d. Enforcement of public health law. e. Health promotion. f. In-situ analysis. g. Environmental and occupational health.
Food Safety and Quality	a. Food sampling. b. Inspection of food premises. c. Preparation of reports and recommendations for follow-up. d. Control of food imports. e. Control of food exports. f. Law enforcement. g. Monitoring and collection of statistics.
Water Supply and Environmental Cleanliness	a. Implementing the rural community water supply project. b. Performing logistics procurement. c. Inspection and monitoring of wastewater disposal projects. d. Maintenance and calibration of test equipment. e. Maintenance of Water Supply and Environmental Sanitation projects.
Drinking Water Quality Control	a. Provision of sampling program and schedule. b. Performing sampling and analysis in the field. c. Take action to improve the quality of the water sample. d. Maintenance and calibration of test equipment.
International Entry Point (Airport, Port and Land)	a. Ship inspection for Ship Health Clearance Certificate. b. Examination of Deratting Certificate / Deratting Exemption Certificate ship. c. Sanitary Airport / Sea Port inspection / evaluation. d. Screening of foreign workers. e. Inspection / screening of imported food.
Legislation and Enforcement	a. Act as an investigating officer. b. Preparation of investigation paper. c. Handling of documents records and exhibits (case items). d. Be a witness in the prosecution's cases.

The skills and experience that equip AEHOs to undertake this role are embedded in their day to day activities. AEHOs must be knowledgeable in the prevention and control of infectious diseases, non-communicable diseases, vector control, food safety and quality, water supply and environmental cleanliness in accordance with established laws and regulations. AEHOs act as the frontline when an outbreak occurs. Their initial focus was on checking the status of public health infrastructure but in other circumstances, AEHO is also responsible for assisting in outbreak management. For example during the COVID-19 outbreak that hit Malaysia in late January 2020, AEHOs are the ones who were responsible for conducting health screening especially at the International Entry Point. For district level, AEHOs are responsible for conducting close contact tracing activities and issuing quarantine notice and release order for every person under investigation (PUI) and person under surveillance (PUS). It becomes a

challenging task when people are in shock and distressed. They assist (more to join forces) with police and other emergency personnel in distributing information papers, suggestions and equipment for personal safety security such as personal protective equipment (PPE), giving talks on health education regarding covid-19 and proper ways of disinfection. Apart from this, AEHOs are also involved in educating people about the dangers of toxic hazards and other hazardous substances.

PROFESSIONAL COMPETENCY AND TRAINING

A competency is the capability to apply or use the knowledge, skills, and abilities required to successfully perform a task in a defined work setting. Environmental health professionals are in a challenging field and the forerunner of public health. The field of work covers every aspect of environmental health to enhance the health and well-being of the community. Many clinical research practitioners express the insufficiency of training in their works. They also perceive that they are unable to make use of their clinical skills due to non-competency factors. The environmental health profession in Malaysia began around 1870, with the formation of the Sanitary Board and the Municipal Corporation of the Municipality Ordinance 1857, the Sanitary Board (London) Enactment 1907, the Quarantine and Disease Enactment 1937 and the Sale of Food and Drug Ordinance 1952 by the British government at that time (EHOM, 2018). Before 1954, basic training began at King Edward College of Medicine, Singapore and a position known as Sanitary Inspector, Market Inspector and Food Inspector. Later, it moved to Young Road, Kuala Lumpur in 1968, jointly managed by the Royal Society of Health London and the Ministry of Health Malaysia.

Graduates who successfully complete the above course will be awarded the Diploma Royal Society of Health for the Promotion of Health for Health Inspector (RSH) or Merinyu Kesihatan Umum. In 1986, the name was changed to Health Inspector and the training centre was at Public Health Institute, Jalan Bangsar Kuala Lumpur. Malaysian Ministry of Health (MOH) reviewed the curriculum of the Health Inspector training program in Malaysia and some changes have been made where the practice of the term system has been replaced with the semester system and there are two courses offered, namely the Certificate of Public Health Assistant and an Environmental Health Diploma. Subsequently in 2004, the training was transferred to the Allied Health Sciences College, Sungai Buloh (KSKB) now known as Malaysia Ministry of Health Training Institutes (ILKKM) and to the Public Health College, Kuching Sarawak. Following that, the Health Inspector changed its name to the AEHO and remains until now.

In Malaysia the eligibility to participate in the environmental health field begins with a formal education of diploma or degree. Advanced courses or Post Basic courses are also provided for grade U29 Assistant Environmental Health Officers who has served for more than 5 years. They are encouraged to attend the course for the purpose of specialization. Basics post courses begin at the Public Health Institute in Jalan Bangsar Kuala Lumpur. There were several courses offered including post basic in Environmental Health, Food Quality Control, Legal and Prosecution, Epidemiology, Occupational Health and Disease Control. Currently there are only two post basic courses offered at the ILKKM Sungai Buloh which are 1) Advanced course of Investigation & Prosecution of Public Health Law 2) Advanced Diploma in Applied Epidemiology & Disease Control (communicable disease). A strategic national training program has to be planned with cooperation among health agencies, academic and other organizations to meet the environmental health staff training needs. In addition, professional qualifications for environmental health professionals are crucial to improve the consistency, capability, quality and readiness of facing various challenges in environmental health (Brooks et al., 2019).

As provision for the demand for environmental health necessitates, environmental health courses are also being offered in public and private universities in Malaysia. Universiti Putra Malaysia (UPM) has been the pioneer as public universities offering Bachelor of Science (Environmental and Occupational Health) since 1998. Other public universities offering the similar programs include Universiti Teknologi MARA (UiTM), Universiti Kebangsaan Malaysia (UKM) and Universiti Sains Malaysia (USM) whereas private universities such as Kuala Lumpur University (UniKL), University Selangor (UNISEL) and MAHSA University also offers environmental health studies at diploma or degree level. Opportunities in pursuing studies in master's degree and PhD level in Environmental Health are also offered at public universities such as UPM, UKM and UiTM. Table 2 shows the training centre that provide Environmental Health course in Malaysia (Malaysian Qualification Agency, 2020).

Table 2: Training Centre for Environmental Health Courses in Malaysia

Level	Certificate	Diploma	Post-basics	Degree	Master	PhD
Institutes	- ILKMM Sg. Buloh - ILKMM Ulu Kinta - ILKMM Kuching	- ILKMM Sg. Buloh - ILKMM Kuching	- ILKMM Sg. Buloh - ILKMM Kuching	-	-	-
Public university	-	UiTM	-	- UPM - UiTM - UKM - USM	- UPM - UiTM - UKM	- UPM - UiTM - UKM
Private university/college	-	- UNISEL - MAHSA University - UNIKL - Jeneva College - PICOMS - City University - SEGI University - Masterskill College	-	-	-	-

Source: Malaysian Qualification Agency

Rapid development of high-tech industries and technological advancements in healthcare public requires AEHO to expand their knowledge and skills in order to handle new emerging health issues. Thus, career opportunities in the healthcare environment are very broad and secure. Through the Service Bills 11 Year 2005 "Pekeliling Perkhidmatan Bil. 27 Tahun 2005", EHO/AEHO Integrated Scheme, the profession grade is starting from U29, U32, U36, U41 / U42, U44, U48, U52, and U54. AEHO graduated in Diploma Environment Health and first appointed (grade U29/32/36), the rank of U41/42/44 with a Bachelor of Environmental Health degree position as EHO. Grade U44, U48, U52, and U54 is a grade offering promotion to higher position.

The biggest challenge of the profession is to enhance and develop professionalism. The three components to the pursuit of professionalism are knowledge, skills and expertise. Providing in-service training, short course, post basics course, advanced course and attachment in the universities or any other related government agencies perhaps can improve the knowledge and skills of this profession. In addition, the EHO and AEHO can be encouraged in participating in conducting research in the environmental health field. This practice may contribute to scientific and evidence-based data to the national health policy makers on issues related to epidemiological morbidity, disease mortality, public health awareness and innovation in solving EH problems (EHOM, 2018). The basic training followed by EHO and AEHO is still not enough to prepare Environmental Health practitioners to face the increasingly challenging environmental health problems in the country. The value of competence is needed to ensure that they are able to handle important meetings and be involved in the decision-making process. According to Environmental Health practitioners, our graduates possess theoretical knowledge but are still less skilled in practical fieldwork or in decision making. Training centres should have learning facilities that are in line with current needs to produce employees who are not only skilled theoretically but practically proficient. There is no doubt that experience will teach them but if given more comprehensive

continuous training will create a large group of 'competence people'. There are competency standards of EHO and AEHO which have been outlined in the Guidelines and Career Development of the EHO and AEHO Professions by MOH. In addition to basic training, there is additional training in certain areas that have been allocated for environmental health officers to improve self-competence. Table 3 shows several examples of additional training that have been designed to create expertise in a particular field. In addition, the EHO and AEHO are also encouraged to participate in conducting research in the environmental health field. This practice may contribute scientific and evidence-based data for national health policy makers on issues related to epidemiological morbidity, disease mortality, public health awareness and innovation in solving the EH problems (EHOM, 2018). To date, there is limited study and research on the environmental health profession compared to other health professions in Malaysia. Addressing this through on-going training and support from top executives may increase the competency level in this profession. Standardized frameworks should be created to ensure efficiency in their works (Faulkner-Gurstein et al., 2019; Speicher et al., 2012; Gowie et al., 2020).

Table 3: Competency Standards training for EHO and AEHO

Field of specialization	Additional training
Public health laws enforcement	Certificate of specialization and prosecution of public health law Law enforcement executive diploma Australian Fumigation Accreditation Scheme (AFAS)
Disease Control	Certificate in Epidemiology of disease control
International Health Surveillance	Certificate of International Health Regulation (IHR) Competency
Food hygiene and safety	Certificate of specialization in food hygiene and safety
Drinking Water Quality Control	Certificate of specialization in Environmental Health

Source: Guidelines and Career Development of the EHO and AEHO Professions by MOH.

Staff competency is a measure to ensure the quality of service among health practitioners in providing the best and sustainable quality of care for the people. In this regard, the Allied Health Professions Act (Act 774) was enacted by the government. The Allied Health Professions Act 2016 (Act 774) was passed by Parliament on 18 February 2016 and enforces starting 1st July 2020. The purpose of this act is to regulate the profession under the Allied Health Profession in all sectors, including public, private and Institutions of Higher Learning (IHL). In addition, this act was also enacted to protect the community from getting services from unqualified practitioners. With this Act, associated health practitioners and the activities carried out will be regulated by the Malaysia Allied Health Professions Council (MAHPC). There are 23 categories of allied health science professions under the Ministry of Health which include three main thrusts namely clinical, health and general laboratory services. Environmental Health Officer (EHO & AEHO) is one of the professions listed in this act. Among the provisions of this act are to supervise matters relating to the Allied Health Professions including training, competency and professional development. This act has provided continuity of professional competency and training of EHO / AEHO through the implementation of continuing professional development (CPD). Continuing Professional Development is various learning activities where health professionals maintain and develop their careers with lifelong learning for ensure that professionals can practice and provide services in a way safe and effective.

All forms of learning and training involved must be recorded into the system and credit points will be awarded according to the type of training. According to (Schostak et al., 2010) the CPD system

is very effective in career development. However, there are challenges in CPD in terms of opportunities and competition to obtain training resources. Therefore, the employer or head of department plays an important role in managing the training needs of their staff. Apart from that, as a recommendation a certification system of competencies and renewal practicing abilities for Environmental Health practitioners need to be developed to strengthen and sustain the life cycle of competencies.

ATTITUDES AND PERCEPTIONS OF ENVIRONMENTAL HEALTH PROFESSIONALS

Attitude is a complex blend of aspects of one's personality, beliefs, values, behaviours, and motivations that also influences work (Cohen et al., 2004). In other word attitude is a person's reaction to a particular situation or person according to their perception. In understanding employee's attitudes and perceptions in environmental health deliveries, many aspects have been highlighted. Ab Aziz et al. (2019) believes that in a risk management concept, communication between two parties are interrelated, whereby one of the key points is to have sense of trust, confidence and credibility to create cooperation. Information processing from the source will influence the credibility of the source, to which the source of information also has to be perceived for good intention, as the objective of the information delivery will be judged first. A person's perception in conducting environmental health delivery will be affected by their trust towards the information itself as well as the informants, especially fearing that there is lacking in information delivered as it comes from various sources. Professionals in public health sector will be attending to many functions, which may include paperwork, performance measures, additional reporting including attending meetings, adding to more task beside their routine work task where being satisfied with their job especially for younger generation can be seen to be less likely, especially researchers believe that age and job satisfaction level are associated with each other, to which as you age, you will be more satisfied with your job (Ab Rahman et al., 2019). Other than that, Bell and Healey (2006) highlighted one of the causes of safety problems are employees not following correct procedures. This situation is related to person attitudes and perceptions where one of the reasons is due to language barrier. It makes them unable to interpret the correct procedures (Trajkovski and Loosemore, 2006). If ones misperceived or misunderstood what ones may say, miscommunication might occur and lead to wrong interpretation.

Ultimately, poor attitudes such as tardiness and rumour mongering are the many few that could have detrimental effects towards an organization's working environment to uphold their objectives and goals (Othman and Suleiman, 2013). Public sector organizations have Key Performance Indicators (KPI) that they need to achieve in order to improve the performance of the whole organization and even with the on-the-job training, the lack of positive attitude and perception of the workers will backfire the organization's goals and objectives. When a person starts to feel insecure about their job status and the position they are in, it will create job stress and dissatisfaction, eventually leading to negative relationships shown between them and their work environment. Conclusively, it is apparent that the attitude and perception of staff in any organization, including in public sectors is well affected by them having a sense of security and shown being taken care of by the management, implying that them being part of the family is important to ensure smooth delivery of work. Government spends annually on training most compared to other forms of expenditure; however indeed it seems that a person's working condition affects their attitude and perspective in their everyday work tasks, ultimately affecting the quality of their output (Ismail and Zainal Abidin, 2010).

In the context of the current pandemic, whereby many environmental and public health staff is on hands on delivering their full force to fight the virus, their attitude and perception of their ad hoc task will be different completely. Research has been done to

understand the impact of the virus to public health workers, where some start to experience anxiety especially being concerned dealing with an enemy that cannot be seen with naked eyes. The workers will start to experience change in attitude, many willing to cooperate as it is their responsibility but this in turn will create higher incidence of anxiety and stress amongst the workers (Tsamakis et al., 2020). On a side note, researches have shown that work-family conflict could also be one of the many contributors to lower productivity rate and work quality. Stressors from home such as children's welfare and conflict with their spouse has the potential to create negative outcomes, leading to more physiological and psychological problems to the environmental health practitioner (Davis et al., 2017; Kan and Yu, 2016; Xu et al., 2018).

Reynolds and Wills (2012) highlights that all EHOs have a perception that their primary job revolves around legislation including inspection and education, to which their work basis also covers any problem-solving situation. Findings from previous research address one of the roadblocks to health promotion is organizational barriers, thus deterring with the workers' attitude towards their working environment. Furthermore, there are still a few that see their work scope as an EHO focuses only on standard enforcement and not beyond that which is also on workplace health and health promotion. The gap is indeed predominant where the role of EHO in an organization is affected by the perception of the officer itself in contributing to public health and environmental health deliveries to the public and even within the organization itself. Cullati et al., (2019) find that conflicts among health care professionals actually are due to disorderly manners amongst the team causing communication barriers especially when their view on a case or a problem contradicts each other. Additionally, a study in Indonesia has shown that in a healthcare setting, with different educational backgrounds and expertise, professionals tend to differ in their values, ethics. This especially can be seen when they lack understanding about their own roles and responsibilities as well as others' roles and responsibilities (Ernawati, 2020). Thus, collaborating professionals in a room to create a comprehensive organization needs thorough quality management review to disable potential disagreement and dispute especially when attitudes and perceptions are being placed on the table.

The Ministry of Health was once responsible for both environmental and public health, but in time these two professions were separated and even underwent specific training such as for sanitary or nuisance inspection and on environmental hazards. In fact, to address and tackle issues especially during outbreaks or pandemic, both Environmental Health and Public Health Medicine should value each other's perspective when it comes to public health as a whole (Cornell, 1996). "... a good leader is someone that can delegate their work, even then, they still need the skill and training to reach this point. When you talk about skills, you also touch on leadership skills and human resource management. As you see, the idea of gaining new skills is to get oneself promoted to a higher level. Therefore, they need more training to be more equipped with the responsibility that they are carrying. Other than that, there is the question of communication skill, where some are lacking, for example in terms of poor in giving supervision, poor instruction skill, poor ambiguity and poor communication flow from top-bottom and bottom-up..." (Rasdi, I., teleconference, July 13, 2020). In the context of Covid19, an Environmental Health professional are the ones that are involved in conducting onsite rapid testing for persons under investigation (PUI) and making sure that these groups of individuals comply with the Ministry of Health's instruction. Even so, they believe that all environmental health officers and assistant environmental health officers must always be able to make impromptu decisions especially in dealing with pandemic and outbreak and to be committed in doing their everyday task whether it is their routine tasks or ad hoc tasks (Lakui, Asri, teleconference, July 13, 2020).

TECHNOLOGY STANDARDIZATION AND UPDATE

Technology is used extensively to provide and deliver health care worldwide. In order to provide health care without a border, e-Health is the most significant platform that can be used parallel to the fast pace movement of technology nowadays. Application such as e-Health is seen as key to addressing the challenges faced by healthcare system's demand due to ageing and better health care and insufficient means (van Gemert-Pijnen, 2012).

Although there is general consensus on the value and prospective effectiveness of e-health, the recognition of these advantages is often weaker than expected, mainly due to implementation difficulties (Wachter, 2016). In the United Kingdom, for example, the National Health Service (NHS) has struggled to make full use of the health technology due to challenges in recognizing how full to incorporate and enforce them (National Health Service, 2014). High-profile failures in implementation continue to be recorded such as failure to integrate e-Health programs at major UK teaching hospitals (Shah, 2015). This highlights the clear need in implementing e-Health to consider the conditions and enhance the common, efficient use of e-health and to tackle the implementation barriers (Ross, 2016).

In Malaysia, the digital healthcare landscape started to take place. One of the main drivers of adoption is mobile device innovation that has radically changed how people interact with each other and how they handle their personal lives. Other reasons are aging population and high life expectancy, lack of healthcare professionals, progress in connectivity infra and technology, massive adoption of smartphones, and how industry has reached acceptance that healthcare IT can enhance healthcare delivery systems. Information and communication technology (ICT) would accelerate progress in providing healthcare for the community. Among technology that could be implemented in Malaysia healthcare is mobile diagnostics where mobile phones can be used in enabling diagnostics and enabling patients to identify and manage their health. For instance, the use of health applications such as AliveECG can assist the user to record their heart rate. Other than that, technology such as Remote Patient Monitoring (RPM), RFID tags and smart watches could also provide healthcare management. The Malaysian Communications and Multimedia Commissions (MCMC) have linked Healthcare Pilots with partners to speed up the delivery of advanced healthcare technologies and next generation communications services (Ramalingam, 2015).

In addition, the government has not only focused on comprehensive interventions, but has also introduced numerous technologies to incorporate health information systems (HIS) into local healthcare. Implementation of HIS will enhance the quality of healthcare, increase productivity and promote data collection and reporting which can assist EHO in communicating information from one area to another area efficiently. Worse still, agencies are making slow performance in implementing this need because of limitations such as the large number of failed services, financial constraints, lack of technology allies and negative views of workers on expectations towards it and acceptance of work practices using HIS (Zakaria and Yusof, 2016). In particular, other variables that can affect employee attitudes towards latest technological systems include personal demographic factors such as age, gender and computer skills, and cultural variables such as effects on workflows, system selection participation, and independence. Added supports today, such as user-machine interaction, accessibility, efficiency and security, can however affect the behaviour of consumers on using the system. Uses of e-system like eNotifikasi, myTIBI, e-measles, myNAR and etc assist environmental health practitioners in reaching the data effortlessly as it is in the tip of their finger. However, all the data must always be up-to-date and tally along the multiple resources to avoid confusion among the users. Therefore, it is crucial for environmental health professionals to optimize the use of technology in order to move forward and work at highest efficiency.

CONCLUSION

It is undeniable that environmental health professionals play a significant role in the surveillance, prevention and control of communicable, non-communicable and vector diseases, food safety and quality, water supply and environmental cleanliness, drinking water quality control, inspections at international entry points and enforcement of legislations. In pursuance of effective environmental health delivery services in Malaysia, environmental health professionals should be given a token of appreciation for the tasks and challenges they faced in this field where professional competency and training; efficient workloads management; and attitudes and perceptions of environmental health professionals and technology standardization and update. Additional professional competencies and training to recognize environmental health professionals can increase their motivations and skills in handling environmental health problems. In addition, skills in managing workloads could essentially assist them in performing their tasks. Good attitudes and perception of the environmental health professionals will positively impact on how environmental health services can be delivered and technology updated and standardization in all the states in the country should be done to ensure effective communication and information delivery services.

CONTRIBUTION STATEMENT

MAEH Focus Group Discussion 2020 was held via teleconference from 25 June - 25 July 2020. SNSM, SMY, AA, MHSA, MAB and FAS conceived the forum and drafted the first version of the discussion. SNSI, IR, KL, SNRS, MAA and NRN analysed the topic. All participants produced the article and approved the final version.

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