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Comparison of Knowledge and Practice on Infectious Diseases Related to Flood Disasters Among Rural and Urban Communities in Hulu Langat, Selangor, Malaysia: A Cross-Sectional Study

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Abstract

Introduction: *Floods create conditions for the spread of infectious diseases that significantly increase the risk of morbidity and mortality.*

Objective: *To assess and compare the knowledge and practice on infectious diseases related to flood disasters among rural and urban communities in Hulu Langat, Selangor, Malaysia.*

Methods*: This study was a cross-sectional study that involved 268 respondents from rural and urban communities in Hulu Langat, Selangor. Purposive sampling was used as it focused on those who were affected by the flood. Descriptive analysis and independent t-test were carried out to assess the knowledge and practices of the rural and urban communities in Hulu Langat towards infectious diseases related to floods.*

Results: *Findings revealed that nearly half of the respondents had a high level of knowledge regarding flood-related infectious diseases, but a moderate level of preventive practices. Besides that, there were differences between rural urban and communities in terms of knowledge. Nevertheless, for practice, there was no difference between urban and rural communities.*

Conclusion: *Based on findings, it is important to improve prevention practices, even though they have good knowledge through comprehensive strategies such as community-based health promotion, education initiatives, community involvement, and infrastructure support to enhance knowledge and practice regarding infectious diseases related to flood disasters.*

Keywords: *Knowledge, Practice, Infectious diseases related to flood disasters*

INTRODUCTION

Floods are a natural disaster that occurs almost every year, especially during the monsoon season. Indeed, the frequency and intensity of extreme rainfall are expected to continue to increase due to climate change (World Health Organization Floods, 2024). Nowadays, urbanization has led to flooding due to development, unsatisfactory drainage systems, bridges and culverts constriction caused by debris accumulation or other factors, waterway channel siltation because of improper land clearing operations, continuous localized heavy rain, the backwater effect of the tides and insufficient river capacity, which is the main contribution to flood disasters, especially in Malaysia. In fact, flooding leads to property damage, crop losses, infectious diseases, and deaths each year (Chan et al., 2022). Moreover, flooding significantly exacerbates public health risks through the emergence and spread of infectious diseases.

Flooding can disrupt clean water supplies and sanitation systems, increasing exposure to pathogens and disease vectors and contributing to outbreaks of infectious diseases. This increases risks of diseases such as cholera, diarrhoea, and typhoid, as well as spreads infections like malaria and leptospirosis through contaminated water that can bring death to humans. Studies have revealed that the pollution of drinking water sources during floods is a primary factor in outbreaks of waterborne diseases, including dysentery and cholera (Liu et al., 2015). Besides that, flooding could affect pathogen dynamics and vector populations, further complicating disease transmission pathways (Okaka & Odhiambo, 2018). Cholera, dysentery, and typhoid fever are commonly reported in post-flood scenarios, emphasizing the critical need for priming communities with adequate knowledge on preventive measures to mitigate such health risks (Basaria et al.,

2023; Okaka et al., 2018; Wang et al., 2018). Moreover, the dynamics of vector-borne diseases, like malaria and dengue fever, can also be significantly altered following a flood, as stagnant water creates ideal breeding grounds for disease-carrying vectors (Basaria et al., 2023; Adekunle, Adegboye & Rahman, 2019). Therefore, the adverse effects of floods can damage infrastructure, housing, unsanitary conditions, and can contribute to the spread of infectious diseases.

In 2021, Selangor was one of the states affected by the floods, accounting for roughly half of Malaysia's losses (Department of Statistics, Malaysia, 2021). Hulu Langat district in Selangor was the worst affected by floods. The floods that affected Hulu Langat, Selangor, in 2021 highlighted these concerns, as populations faced increased risks due to water contamination, inadequate sanitation, and the displacement of communities. According to the WHO, the transmission of infectious diseases can occur due to water, sanitation, food, and air quality that lead to the spread of epidemics (World Health Organization, 2024). Therefore, creating community awareness is important to increase knowledge about infectious diseases so that preventive measures can be practiced to reduce the risk of epidemics and the transmission of infectious diseases following floods. This study aims to assess and compare the knowledge and practice on infectious diseases related to flood disasters among community in Hulu Langat, Selangor.

MATERIALS AND METHODS

This is a cross-sectional study conducted in distric of Hulu Langat, Selangor. These locations were chosen because they have experienced floods, which pose a high risk of spreading infectious diseases. The target population involved in this research was the community in the Hulu Langat district in Selangor. Residents in Taman Sri Nanding in Hulu Langat and Taman Lembah Mewah in Kajang were selected purposively due to infectious diseases caused by floods. Taman Lembah Mewah in Kajang is selected as an urban area, while Taman Sri Nanding in Hulu Langat is selected as a rural area. Then, random sampling was used to obtain 268 respondents from the community that was affected by the flood in selected urban and rural areas in Hulu Langat, Selangor.

The respondents were being assessed using the questionnaire was modified based on Knowledge, Attitudes, and Practices (KAP) Surveys During Cholera Vaccination Campaigns, according to the suitability of this research as well as the core content of the flood and communicable disease fact sheet by the World Health Organization (WHO, 2024). Cross-checking and authentication from experts in the field of study were used to ensure the study instrument's content validity. In this questionnaire, there were 4 sections included Section A consists of socio-demographic characteristics of the respondents. Section B consists of knowledge about flood-related infectious diseases. The knowledge assessment has 36 item responses. The type of question was multiple-choice questions in which each correct response was given 1 score, while the wrong one was given 0 score. The score of the respondents' knowledge can be categorized as follows: high knowledge: 29-36, moderate knowledge: 22-28, and poor knowledge: 0-21. Section C consists of 10 questions on Preventive Practice on flood-related infectious diseases. The question was using Likert's scale questionnaire in which the score of practice was given as follows: always 4, often 3, sometimes 2, seldom 1, and never 0. The score was vice versa when assessing the negative practice question. The score of the respondents' practice can be categorized as follows: high practice: 32-40, moderate practice: 24-31 and poor practice: 0-23.

The data collected was analyzed using SPSS Software Version 27. The statistical tests used in this study were descriptive analysis, and independent t-test. A p-value of <0.05 was taken as statistically significant.

RESULTS

Table 1 shows the socio-demographic characteristics of respondents in the study. Based on the study, the highest number of respondents in rural area was among those aged 18-29 years (34.3%), while in urban areas, aged 30-39 years (41.8%). Male respondents were higher in rural area (51.5%) differ from urban area, where female respondents were higher in number(57.5%). Both respondents living in rural and urban area were majority Malay (96.3%) and (91.8%), respectively. Most of the respondents in rural area had a diploma (32.8%) as their highest education level, while in urban community, bachelor's degree (47.0%). Almost half of the respondents in rural area have income within the range of RM25001 to RM4850 (42.5%), while most of the respondents' household income in urban area has a salary ranging from RM4851 to RM10,970.

Table 1: Socio-demographics characteristics of respondents

Variables	Rural (n=134)		Urban (n=134)		Total (N=268)	
	Frequency, n (%)	Mean ± SD	Frequency, n (%)	Mean ± SD	Frequency, n (%)	Mean ± SD
Age		1.98±0.818		2.01±0.766		2.00 ± 0.791
18-29 years	46(34.3)		38(28.4)		84(31.3)	
30-39 years	45(33.6)		56(41.8)		101(37.7)	
40-50 years	43(32.1)		40(29.9)		83(31.0)	
Gender		1.49±0.502		1.57±0.496		1.53 ± 0.500
Male	69(51.5)		57(42.5)		126 (47.0)	
Female	65(48.5)		77(57.5)		142(53.0)	
Race		1.04±0.190		1.10±0.344		1.07 ± 0.279
Malay	129(96.3)		123(91.8)		252(94.0)	
Chinese	5(3.7)		9(6.7)		14(5.2)	
Indian	0(0.0)		2(1.5)		2(0.7)	
Education Level		3.40±1.104		4.38±0.848		3.89 ± 1.098
Secondary School	38(28.4)		2(1.5)		40(14.9)	
Pre-University	29(21.6)		19(14.2)		48(17.9)	
Diploma	44(32.8)		45(33.6)		89(33.2)	
Bachelor degree	21(15.7)		63(47.0)		84(31.3)	
Master degree	2(1.5)		4(3.0)		6(2.2)	
Doctoral Degree	0(0.0)		1(0.7)		1(0.4)	
Household Income		2.04±0.760		2.85±0.771		2.44 ± 0.866
Less than RM2500	36(26.9)		13(9.7)		49(18.3	
RM2501-RM4850	57(42.5)		12(9.0)		69(25.7)	
RM4851-RM10,970	41(30.6)		91(67.9)		132(49.3)	
More than RM10,970	0(0.0)		18(13.4)		18(6.7)	

Level of knowledge and practice on infectious diseases about flood

Table 2 shows that 127 (47.4%) of respondents had a high level of knowledge regarding flood-related infectious diseases, while 108 (40.3%) demonstrated moderate knowledge, and 33 (12.3%) showed poor knowledge about flood-related infectious diseases. This result also shows that 84(62.7%) respondents from

urban area have high knowledge, while 64 (47.8%) of those living in rural areas have moderate level of knowledge on flood-related infectious disease. For preventive practice level, rural community showed a high level of practice with 61(45.5%), compared to urban community have moderate level of practice, 68 (50.7%). Overall, the knowledge on flood-related infectious diseases among the respondents were in high level 127 (47.4%) and the practice level among most of the respondents were in moderate level 124 (46.3%).

Table 2 : The level of knowledge and practice about flood-related infectious diseases

Variables	**Frequency, n** (%)			
	Rural (n=134)	**Urban (n=134)**	**Total (N=268)**	
Knowledge				
Poor	27(20.1)	6(4.5)	33 (12.3)	
Moderate	64(47.8)	44(32.8)	108 (40.3)	
High	43(32.1)	84(62.7)	127 (47.4)	
Practice				
Poor	17(12.7)	21(15.7)	38 (14.2)	
Moderate	56(41.8)	68(50.7)	124 (46.3)	
High	61(45.5)	45(33.6)	106 (39.6)	

Comparison of Knowledge and Practice on Infectious Diseases Related to Flood between Rural and Urban Community in Hulu Langat.

Based on Table 3 revealed that there was a significant difference in knowledge between rural and urban community in Hulu Langat. However, the finding revealed that there was no significant difference in practice between rural and urban community in Hulu Langat.

Table 3 Comparison of Knowledge and Practice on Infectious Disease Related to Flood between Rural and Urban

Variable	**Mean (SD)**		**Z**	***p-value**
	Rural	**Urban**		
Knowledge	27.27 (4.574)	29.69 (4.188)	0.552	*<0.001
Practice	31.96 (5.502)	31.02 (5.329)	0.233	0.160

* p is significant when <0.05

DISCUSSION

In this study, the rural and urban communities in Hulu Langat have a high level of knowledge about infectious diseases related to flood disasters. This could be related to the experience of past floods, which have increased their awareness of communicable diseases, causing a high percentage of high levels of knowledge about flood-related diseases in rural and urban communities in Hulu Langat. This is supported by Noor et al. 2022 mentions that a well-informed population in a community leads to increased disaster awareness. Nevertheless, the community in Hulu Langat shows a moderate level of practice of prevention of infectious diseases related to flood disasters. Despite adequate knowledge levels reported in this study, significant gaps persist regarding actual protective behaviors. This discrepancy underscores a critical gap between knowledge and application, suggesting that mere awareness does not suffice to instigate behavior change (Mavrouli et al., 2022; Brown & Murray, 2013). This implies that having good knowledge is not adequate. This discrepancy is often reported in disaster scenarios, where knowledge does not always translate

into action. These findings are consistent with the previous study, which mentions that good knowledge is not reflected in their preventive practices of flood-related infectious diseases (Nozmi et al., 2018). Promoting community-based health education and engagement initiatives that emphasize practical applications of knowledge can bridge this gap. Therefore, to improve preventive measures, it is important to provide health education to prevent outbreaks of flood-related infectious diseases among the urban community.

The current study revealed that respondents living in the urban area in Hulu Langat had a slightly higher knowledge level compared to the respondents living in the rural area of Hulu Langat. This is similar to previous studies showing that urban communities are more knowledgeable than rural communities (Ripon et al., 2022). A study by Chen et al. (2019) found that rural residents had less access to health information from sources such as health care providers than urban residents. Indeed, it may be more difficult for rural residents to access health information, especially those with low health literacy, due to structural barriers like a lack of healthcare services and little media exposure. Nevertheless, it is not all information to rely on internet sources in gaining easy access to information or knowledge about everything, including infectious diseases, is necessarily correct and reliable, which guarantees the accuracy of such knowledge. (Abdullah et al., 2019). To address the challenges posed by flooding and its associated infectious diseases, initiatives of social media can also be used as a tool to disseminate information on infrastructure, and access to health information via media (TV, radio, social media) might be similar in both settings. Besides, health and education campaigns are important not only to inform the community about potential health threats following flooding but also to focus on enhancing community resilience through education on practical hygiene measures, such as safe water collection, proper sanitation, and vector control (Dumevi et al., 2024). Recommendations for enhancing community engagement and actionable knowledge regarding disease prevention must include collaboration with local leaders and health organizations to mobilize resources effectively (Datta et al., 2019; Liu et al., 2015).

CONCLUSION

In conclusion, respondents demonstrated high knowledge levels related to flood-associated infectious diseases, but a moderate level of preventive practices. Further, there were differences between rural urban and communities in terms of knowledge. It is recommended that strengthening public health initiatives through community-based health promotion and education initiatives, community engagement, and infrastructural support is essential to raise awareness of flood-related infectious disease for improving community resilience and reducing disease incidence in future flood scenarios. Besides that, increasing the accessibility of health information, such as social media also one of the initiatives that may positively impact public protection against infectious disease awareness and public health behavioural changes. Finally, collaboration between the health sector and other sectors, such as local authorities, private organizations, policymakers, and nonprofit groups, should be encouraged to improve the community's overall health knowledge and practice on infectious diseases related to flood disasters. Therefore, comprehensive approaches are crucial in crafting effective public health responses to flooding and its associated health risks.

ETHICS APPROVAL: This study was approved by the Research Committee of University Putra Malaysia, JKEUPM, (Reference:UPM/TNCPI/RMC /1.4.18.2 (JKEUPM)).

CONFLICT OF INTEREST: The authors declare no conflict of interest.

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