ORIGINAL ARTICLE

URBAN AND RURAL INEQUALITY IN KNOWLEDGE, ATTITUDE AND PRACTICE ON HAZE POLLUTION EPISODE IN KLANG VALLEY, MALAYSIA

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ABSTRACT

Introduction: Transboundary haze occurred was primarily derived from seasonal forest fires which has highly been concerned of the health effect on the local community. As awareness of the source and dangers of smoke haze spread, Malaysian government increasingly came under pressure from the public and civil society at the national, state, and district level to address the haze issues. However, the knowledge, attitude, and practice (KAP) inequalities of urban and rural community could be a barrier in promoting awareness on haze. Objective: To determine the urban and rural inequality in KAP on haze. Methodology: A total of 400 urban and rural residents from Klang Valley was recruited to participate in this study. A validated survey form was used as the study instrument which composed of four parts: (1) Sociodemographic information, (2) Haze knowledge, (3) Attitude (concerns) during haze episodes, (4) Practices (protective behaviors) to prevent against the health effects of haze. Result: There were significant differences of KAP on transboundary haze among urban-rural population. Urban population has higher knowledge and protective behaviors on hazes; however, both the rural-urban residents presented moderate levels of concerns on hazes. Conclusion: It is necessary to provide timely information (knowledge and practices) on haze to rural residents, at the same time, improve the urban residents' concerns (attitudes) over the haze phenomenon. This will help to raise the overall awareness level to transboundary haze by translating into a state of the resilient community.

***Keywords**: Urban-Rural, Knowledge Attitude and Practice, Inequality, Haze*

INTRODUCTION

Haze is defined as the presence of fine particles (0.1-1.0 μm in diameter) dispersed at a high concentration through a portion of the atmosphere that diminishes the horizontal visibility, giving the atmosphere opalescent appearace[1]. There has been a periodic incidence of fire-related haze episodes in Southeast Asia since 1970s. The transboundary haze happened in the country can be associated two main factors: (1) Shallow localized haze which mainly occurs in urbanized areas, arises from the trapping of pollutants from anthropogenic emissions in response to a stabilization of the atmosphere, (2) Dense haze due to the prevailing winds of suspended ash participles arising from the burning of vegetation by small holders, plantation owners, and logging companies[2]. In the Introduction section, present clearly and briefly the problem investigated, with relevant references. The main results should be enunciated.

Based on the National Air Quality standard of Malaysia, the monitored ambient air quality is recorded as Air Pollution Index (API). The API is used to measure carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO2), sulphur dioxide (SO_2) and particles matters in aerodynamics less than 10 μm (PM10). The API is used as a means to communicate the air quality to the general public and provide precautionary measures in their daily activity. During the transboundary haze episode happened in the year 2015, the level of unhealthy API reading were recorded all over the regions of Malaysia. Malaysia's aviation and maritime sectors were put on high alert following a worsening in view of the reduced visibility caused by the haze, the ministry of education has also ordered to close the schools from different states when the API readings surpassed 200 levels. An estimated 2,696,110 students and 4,778 schools were affected during this transboundary haze.

As awareness of the source and dangers of smoke haze spread, Malaysian government increasingly came under pressure from the public and civil society at the national, state, and district level to address the haze issues. In this study, we particularly examine the haze awareness (knowledge), concerns (attitude) and response (practices) levels among both rural and urban areas of *Klang* Valley. This region has been shown to have a high potential for haze pollution since the urban area has evolved rapidly from urbanization and industrialization, which are considered as the main contributor for hazes from vehicle and industrial emissions. At the same time, even though the rural area is located in the outskirts of *Klang* Valley, most rural residents owned agricultural lands which used widely to expand the palm oil plantation. Open burning is common among the latter groups due to the mass oil palm plantation, and to discard domestic waste. Unlike rural areas, urban settlements are defined by their advanced civic

amenities, opportunities for education, facilities for transport, business and social interaction and overall better standard of living. Factors like this may not only contribute to communities' difference in knowledge of haze, but also the concerns during haze episodes, and self-protective behaviors to prevent against the direct health effects of haze.

Knowledge (K) is a precondition for awareness to understand and evaluate the impact of haze on the community[3]; Attitude (A) is the manner, disposition, feeling with regards to a person's tendency of the mind to a negative attitudes and views of a concerned issues[4]; and Practice (P) is the observable actions of an individual in response to hazards with a stimulated action. By understanding the KAP inequalities of the urban and rural residents on haze, it helps to close the gaps of reported hospital admission, haze-incidence and prevalence rate between these two groups. Therefore, this study aims to establish a good baseline in determining the effectiveness of the institutional in educating the public on haze. It can also tie the knot between different ranges of communities in understanding the practices and attitude in response to hazes.

MATERIALS AND METHODS

This is a comparative cross-sectional study to examine the urban-rural KAP levels of haze. A total of 400 urban and rural residents from *Klang* Valley were randomly selected to participate in this study. The face-to-face interview was conducted by using a validated survey form as the study instrument which composed of four parts: (1) Sociodemographic information, (2) Haze knowledge, (3) Attitude (concerns) during haze episodes, (4) Practices (protective behaviors) to prevent against the health effects of haze. Table 1 showed the 10 questions items which were asked to explore one's knowledge (K) level on haze.

Possible scores range between 0-10 points. The obtained score were then converted into 3 categories, such that Good (Score > mean ± SD); Moderate (Score = means ± SD); Low (Score < mean ± SD)[5].

Table 2 showed the questions items which were asked to explore one's attitude (A) level during haze. Possible scores range between 1-50 points. The obtained score from 10 questions items, then converted into different attitude levels, such that High (Score > mean ± SD); Medium (Score = mean ± SD); Low (Score < mean ± SD).

Table 1. Knowledge (Yes/No) about haze

1	The location of the meteorological centre is located in every district.
2	Particulate matter with size of 2.5 μm ($PM_{2.5}$) more dangerous than particulate matter with size of 10 μm (PM_{10})?
3	Haze can cause respiratory related disease such as asthma, cough and sore throat?
4	Haze can give detrimental effects to your health?
5	The government does something to tackle the haze issue in Malaysia?
6	Action of the government to reduce haze in Malaysia?
7	The effectiveness of N95 mask compares to surgical mask?
8	The increasing of industrial activities makes haze phenomenon more serious?
9	The large scale of forest fire in Sumatra, Indonesia is the major cause of haze?
10	The hotspots record can be viewed from the Department of Environment webpage.

Scale: Correct answer=1 point; Wrong answer = 0 point

Table 2. Attitude (Score 1-5) during haze

1	The reading of the API in my area is below 100 and it does not make me worry.
2	The haze management is the responsibility of the government, not my responsibility
3	I want to reduce the outdoor activities during haze.
4	I think health education, especially during haze is important to the community.
5	I feel discomfort when wearing masks during haze.
6	The wearing of masks during haze does not give me any benefit.
7	I think the taking off a lot of drinking water during haze is not important to me.
8	My family does not encourage me to stay outside during haze.
9	I believe that the distribution of information regarding haze via the media can help me getting more info
10	I think that the exposure about health issues should be taught to students only

Scale: 1=strongly disagree (1 point), 2=disagree (2 point), 3=not sure (3 point), 4=agree (4 point), 5=strongly agree (5 point)

Table 3 showed the questions items which were asked to explore one's practice (P) level during haze. Each correct answer will be indicated as 1 point, and a wrong answer with 0 points. The obtained score was then converted into 3 categories, such that Good (Score > mean ± SD); Poor (Score ≤ mean ± SD).

Table 3. Practice (Yes/No) during haze

1	The location of the meteorological centre is located in every district.
2	Particulate matter with size of 2.5 μm ($PM_{2.5}$) more dangerous than particulate matter with size of 10 μm (PM_{10})?
3	Haze can cause respiratory related disease such as asthma, cough and sore throat?
4	Haze can give detrimental effects to your health?
5	The government does something to tackle the haze issue in Malaysia?
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7	The effectiveness of N95 mask compares to surgical mask?
8	The increasing of industrial activities makes haze phenomenon more serious?
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Scale: Correct answer=1 point; Wrong answer = 0 point

RESULTS

A total of 200 rural and 200 urban residents at the age of 21 to 55 years of age participated in this study. Among the rural residents, it comprises of 90 females and 110 males; while the urban residents comprise of 107 females and 93 males. A Malay race made up 85% of rural community and 60% of the urban community, Chinese race made up 10% of the rural population and 30% of the urban population, and Indian race made up 4% of the rural community and 8% of urban community. At least 80% of the rural community claimed to have the total household income below MYR 5,000, while 70% of the urban residents reported to earn above MYR 5,000 for the total household income. The survey revealed that, 95.5% of the respondents were aware of the haze phenomenon. The main social media chosen by the participants are internet (60%), followed by television (18%), radio (9.5%), newspaper (7.5%) and friends (5%). Even though 63.72% of the respondents knowing the API index, but only 41.75% of the respondents perform daily checking on the API reading during haze.

Table 4 compare the level of knowledge on haze among the study population. Result showed that 70% of the urban residents have an average level of knowledge, and 21.5% have high knowledge on haze. Conversely, 50% of rural residents claimed to have average knowledge and 33% of them have low knowledge on haze. When independent t-test used to compare the difference, results showed that there is a significant difference of the level of knowledge on haze among urban and rural residents in *Klang* Valley.

Table 4. Comparison of the Level of knowledge on haze

Level of knowledge	Urban(N=200)	Rural (N=200)
High knowledge, N(%)	43 (21.5)	34 (17)
Average knowledge, N(%)	140 (70)	100 (50)
Low knowledge, N(%)	17 (8.5)	66 (33)
Mean (SD)	7.12 (1.61)	5.77 (1.62)
***p*-value**	0.018**	

**P is significant at 0.05 level

Level of the attitude of the respondent on haze and its distribution is shown in Table 5. Result showed that 50% of urban residents and 47.5% of rural residents had a medium level of attitude on haze. When independent t-test used to compare the difference, results showed that there is no significant difference in the level of attitude responds during the haze between urban and rural residents in *Klang*Valley.

Table 5. Comparison of the Level of attitude on haze

Level of knowledge	Urban(N=200)	Rural (N=200)
High attitude, N(%)	20 (10)	25 (12.5)
Medium attitude, N(%)	100 (50)	95 (47.5)
Low attitude, N(%)	80 (40)	80 (40)
Mean (SD)	29.98 (10.54)	28.81 (9.72)
***p*-value**	>0.05	

**P is significant at 0.05 level

Level of the practices of respondent on haze and its distribution is shown in Table 6. Result showed that most of the urban (74.5%) and rural (88%) residents recorded bad practices during haze. Nevertheless, when independent t-test used to compare the difference, results showed that there is a significant difference of the level of attitude responds during the haze between urban and rural residents in *Klang* Valley.

Table 6. Comparison of the Level of practice on haze

Level of knowledge	Urban(N=200)	Rural (N=200)
Good practice, N (%)	51 (25.5)	24 (12)
Bad practice, N (%)	149 (74.5)	176 (88)
Mean (SD)	5.07 (2.36)	3.51 (2.57)
***p*-value**	0.012**	

**P is significant at 0.05 level

DISCUSSION

It is widely accepted that knowledge on haze is important for the community to adopt the proper practice during haze. In this study, there is moderate awareness of the causes and effects of haze among both rural and urban residents. Knowledge is a precondition of environmental awareness[6]. In fact, one will not exhibit the criteria of proper practice with a positive attitude without sufficient knowledge during an event of haze[7]. Knowledge will certainly affect one's self-learning, managing behaviors, situation awareness and decision making during critical situations[8]. Individual knowledge regarding health risks is known to profoundly influence risk perception which, in turn, affects a person's attitude[9].

In regards to attitudes, as could be expected, general attitudes towards the haze are highly negative amongst the overall population. The attitude is a precursor in a person's practice, it is to say the attitude towards haze is an important determinant of the community practice during haze phenomenon. For instance, the large majority of all respondents reported that considering the health effects brought by haze exposure, they have cancelled outdoor activities. Nevertheless, the present study reflects that both rural-urban community has negative expectation for the future air quality. This is consistent with the past study, which indicated pessimism with regards to the likelihood of solving or even mitigating the problem of transboundary haze[10].The notable shift in this expectation towards transboundary haze has shown while most of the respondents claimed that, the government is not taking prompt response to tackle the haze issues, and responded negative view of reading hotspots record or monitoring daily API from the updates from the Department of Environment.

Challenging the community attitude is a challenging task, because people's attitude differs and attitudes accumulates throughout the upbringing process depends on the belief of the individual himself [7]. This study also suggested that knowledge alone cannot bring good behaviors and practices as both the urban and rural residents has no significant difference in their attitude during haze. This is consistent with past study who argue that even though attitude is a requisite for positive action, attitude alone may not push an individual into action[11].

In regards to practices, concern over the effects of transboundary haze on their health rarely reported among rural residents, particularly between concerns of health and the practices of taking protective actions not appears to be in place. The result of this study showed that, among the practice that should be improved includes, wearing N95 masks, staying indoors and keep one's hydrating adequately. This is consistent with previous study which suggested that the knowledge on haze and attitude has a direct influence on the practice during the haze [7]. One should have a sense of positive moral norms to promote the right behaviors, and concerns of haze pollution. This significant intention and attitude shall be inculcated with growing awareness and self-efficacy among the community. Self-efficacy is upon internal factors, dealing with the ease of difficulty of performing a behavior[12]. Therefore, other than impart knowledge of the outcome of haze pollution to the community, improving the understanding of damaged caused by haze due to man-made action is of crucial important to instil sense of community in each individuals.

By adopting Knowledge-Attitudes-Practices approach, an iceberg phenomenon is observed in this study. The transboundary haze has brought several health and welfare problem, but still there is outweighed by information that remain undiscovered, much as the unseen part of an iceberg is much larger than the part that is visible above the water. This unseen part mainly includes the pessimistic attitude and negative practices. According to the Health Belief Model[9], the primary determinants of behavior are whether individuals perceive a threat, how severe they perceive the threat to be, how they value the benefits of changing behavior, what barriers or negative implications they associate with the behavior change, and whether they have the efficacy to change their behavior.

As shown in Figure 1 below, one's knowledge, perception, and attitude are fundamental in determining how one behaves towards the transboundary haze. An individual's level of knowledge about these environmental health hazards influences how he or she perceives the level of risk associated with exposure[13-14]. The current study revealed that, both urban-rural residents are lacking the self-awareness of early preparedness and prompt response to tackle haze. It is recommended that, the knowledge should deliver to the community at all levels through participatory approaches in the first place. It is noted that successful knowledge sharing would create awareness which will enhance ones' self-efficacy, and coping resources and increase information exchange by social supports among the community (How et al., 2015). By considering the different sociodemographic background among urban-rural residents, the government or non-profit organization may tailor the communication strategies and designing future interventions for community-based haze management. This sustainable development could continually secure the people's health with early preparedness on the warning system and response with prompt action within the community. This will help to raise the overall awareness level to transboundary haze by translating into a state of the resilient community.

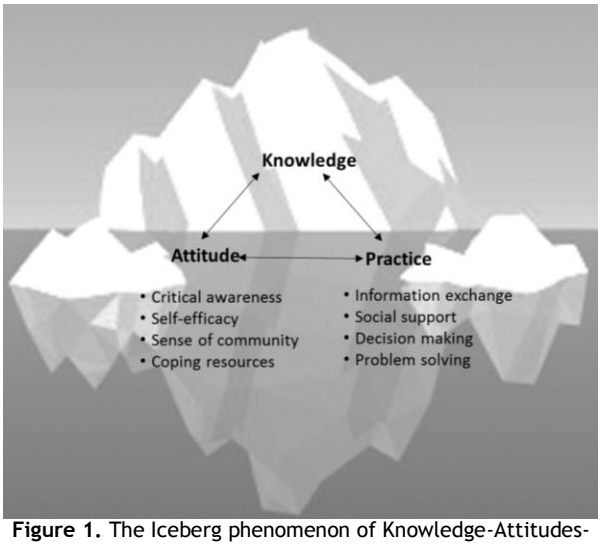

Figure 1. The Iceberg phenomenon of Knowledge-Attitudes-Practices approach

CONCLUSION

In this study, we examined levels of awareness, concern, and protective behavior amongst people in rural and urban residents in *Klang* Valley in regards to the transboundary air pollution that has affected Southeast Asia on a seasonal basis over the past three decades. Generally, this study indicated that the level of knowledge and attitude among the rural and urban community was moderate. However, the practice during haze was low on both urban and rural communities. Although certain knowledge was higher among the urban community, the attitude and practice shown by the urban community were still relatively low. The rural community otherwise showed lacking in certain specific knowledge on haze.

Transboundary haze is a critical environmental health problem and we need to have a better understanding of the urban and rural communities' perception of the haze to implement better prevention and control. On one hand, there is need to train environmental health workers to plan and prepare for potential health and environmental impacts from haze; on the other hand, it is necessary for health educate the masses especially those living in the rural areas. Therefore, it is necessary to provide accurate and timely information, both through the media and the education system, is likely to lessen the human impact of haze events in Malaysia, especially on those most vulnerable to its effects.

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COMPETING INTERESTS

There is no conflict of interest.

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