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Psychological and Physical Impact of the Haze Amongst a Malaysian Community

(Kesan Psikologi dan Fizikal oleh Jerebu Terhadap Komuniti Malaysia)

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ABSTRACT

A total of 306 Malaysian university students and staff were surveyed to ascertain the physical and emotional effects of the polluted haze on them. All subjects completed self-reported questionnaires. Analysis of the results indicated that the majority of subjects reduced their outdoor activities and sports, and also reported an increase in emotional and physical health problems. The results indicated that there was a general increase in emotional problems such as feeling depressed, lacking in energy, not feeling like doing anything, feeling anxious and afraid, difficulty sleeping, feeling agitated and irritable, and having no appetite. There was also an increase in physical symptoms such as itchy or red eyes, itchy or running nose, dry throat/cough, headaches, nausea, and fever. This study indicated that emotional and behavioural problems are just as common during the haze, when compared with physical health problems. The study also suggests that there are a broad range of problems which health care and human resource departments need to be aware of and take precautions to minimize during a haze.

Key words: Haze, Pollution, Mental Health, Physical Health

ABSTRAK

306 pelajar dan kakitangan universiti berbangsa Malaysia telah dikaji melalui soal selidik untuk menentukan kesan jerebu terhadap mereka dari segi fizikal dan emosional. Semua subjek telah menyiapkan kertas soal selidik tersebut. Analisa menunjukkan bahawa kebanyakan subjek mengurangkan aktiviti luaran dan sukan. Selain itu, mereka juga melaporkan lebih banyak mengalami masalah emosional seperti kemurungan, kekurangan tenaga, tiada motivasi untuk melakukan sebarang aktiviti, rasa cemas dan takut, masalah tidur, lebih cepat naik marah, dan masalah selera makan. Tambahan pula, analisa juga menunjukkan wujudnya lebih banyak simptom fizikal seperti kegatalan atau mata merah, kegatalan atau hidung basah, tekak kering/batuk, sakit kepala, rasa ingin muntah dan juga demam. Kajian ini menunjukkan bahawa

masalah emosional dan tingkah laku juga sering berlaku semasa jerebu apabila dibandingkan dengan masalah kesihatan fizikal. Kajian ini juga telah mendapati bahawa terdapat banyak masalah yang perlu disedari oleh jabatan kesihatan dan sumber manusia, dengan itu langkah berjaga-jaga perlu diambil untuk mengurangkan kesan jerebu terhadap kesihatan komuniti.

Kata kunci: Jerebu, Pencemaran, Kesihatan Mental, Kesihatan Fizikal

INTRODUCTION

In August 2005, open burning of land and forest fires in Kalimantan and Sumatra, in Indonesia caused a great haze which spread over the larger parts of South East Asia. Malaysia was affected and the haze hit its peak on August 11, 2005 when the Air Pollution Index reached levels higher than 300 in some areas. During this time, a state of emergency was announced. Given the hazardous air quality, some schools were closed to keep the children from moving around outdoors. With the negative effects on the haze, researchers began to investigate effects of haze exposure on humans. Whilst several studies had been conducted on the physical effects, there were few reports on activity levels and the psychological effects of the haze. This paper describes a brief study on the effects of the haze on the physical and emotional state of a Malaysian community.

The haze is an atmospheric phenomenon where pollutant particles, such as dust and smoke, accumulate in the air and obscure the normal clarity of the sky (Khoo 2006). It occurs when smoke and dust particles accumulate in relatively dry air. Dense haze caused by industrial pollution is also known as smog.

There are many sources for haze particles. Amongst the more common causes are forest fires, industrial processing, peat field fires, and exhaust fumes from vehicles (Aditama 2000). The severity of the haze is measured using automated optical instruments known as "Nephelometers", which measures the visibility of the haze at traffic control points and at ports. Given that the haze is an indicator of poor air quality, a standard air index is used to measure air quality (U.S. Environmental Protection Agency 2007). The Air Quality Index (AQI) is a standardized indicator of the air quality at a given location. There are six main health categories with specific color codes. The index ranges from 0 -500, where a lower score is indicative of a healthier air condition. In Malaysia, the air quality is normally reported as the API or Air Pollution Index. The measurement system of API is very similar to the AQI which consists of different air index categories. The only difference between both measurements is that, unlike the American AQI, the index number of API in Malaysia can exceed 500.

Physical health problems are normally the result of excessive exposure to the haze (Shiga 2004). There are lots of physical illnesses which are associated with environmental pollution. Chronic bronchitis develops over along period of time and can become crippling through combination of many factors and air

pollution is one of the many factors (Terry 1964). In addition, Aditama (2000) showed how the impact of haze from forest fires affects the human lung in Indonesia. The study indicated that there was a significant increase in respiratory and lung complaints. Shima et al. (2002) studied the effects of air pollution on the prevalence and incidence of asthma in 1037 Japanese children. These researchers determined serum concentrations of complement components C3c and C4 in the children who lived in 4 communities with different levels of air pollution in Japan. They found that serum levels of C3c and C4 levels were higher in children who lived in Osaka, which had a high level of air pollution, than in children who lived in areas of low air pollution. These finding indicated that air pollution, including nitrogen dioxide which is contained in the haze, may be an important factor in the development of asthma among children in urban districts. In general, the research seems to indicate that air pollution can cause increased physical health problems (Bladen 1983; Chen et al. 2004), allergies (Chew, Goh, & Lee 1999), cancer (Choi, Inoue, Shinozaki 1997; Gupta et al. 2001), as well as pre-term delivery (Lin et al. 2001).

Research also indicates that air pollution also has negative effects on human emotions and behaviours (Briere, Downes & Spensley 1983; Reeve 2005; Rotton 1983). Emotions are short-lived subjective-physiological-functional-expressive phenomena that orchestrate how we react adaptively to the important events in lives (Reeve 2005). Emotional problems occur when there are disruptions in the system and affecting our daily lives. Symptoms of emotional problems include feeling depressed, have no energy, feel more anxious and afraid, and having difficulty sleeping. Emotional problems can be the result of negative environmental factors such as air pollution and the haze. Rotton (1983) studied North American undergraduate students in Florida who were exposed to simulated pollution odors produced by ammonium sulfide and other foul-smelling chemicals. Compared with individuals who had not been exposed, students in polluted settings described their moods and emotions in more negative terms, expressed less liking for individuals not sharing their fate, gave lower evaluations of their surroundings, formed more negative attitudes about social stimuli, and spent less time in the setting. The result of these emotional problems leads to and increased need for medical assistance. Briere, Downes and Spensley (1983) studied a total of 4,025 visits to the Psychiatric Emergency Observation Unit at the Sacramento Medical Center, USA. The study observed that there was a significant relationship between negative meteorological conditions and increased psychiatric emergency-room visits by clinical patients suffering from depression and schizophrenia. In other words, when the pollution in the air increased, there were more depressed and schizophrenic patients seeking assistance.

Despite knowing the physical and emotional impact cause by the haze, we do not know how much and how it affects daily routine and life style of people. During the week-long choking smog surrounding the suburbs of Malaysia,

people were advised by the health authorities to reduce outdoor activities. Many public facilities in the haze emergency areas were terminated for a short period of time until the haze cleared. Until recently, there is still no research study on the area of leisure activities, life style and air pollution.

In this study, we hypothesised that greater haze level would be associated with more physical and emotional problems. In addition the haze would reduce people's outdoor activity levels.

EXPERIMENTAL METHODS

A single survey was used to obtain the information from the subjects. A series of questions were administered to understand the impact of haze on the physical, emotional and behavioral of people. The questionnaire was administered by three research assistants over a period of one day on the 11th August 2005 to report on their behaviours in the first three days that the haze begun. They were also asked to report their behaviours 3 weeks prior to the haze.

SUBJECTS

The sample consists of 306 staff and students from Sunway University College. Of this number, there were 252 students, 39 staff members and 2 visitors. There were 132 males and 166 females. The average age of the sample was 20.8 years.

MEASUREMENT

The questionnaire was developed by the staff of the Department of Psychology, Sunway University College.

Air Quality Study Questionnaire

The Air Quality Study Questionnaire is a self-report scale designed to measure the haze impact of people physically, emotionally and behaviorally. There were a total of 47 questions which were grouped into four categories: demographics, activity level, physical and emotional symptoms (see Appendix 1). All questions generally require the respondent to report on their behaviours in the first three days that the haze had begun (i.e., 9th, 10th and 11th August 2005). This means that in the first day the haze was generally mild, and within three days the haze had reached hazardous levels. Three days was chosen as this was the time when the haze began to worsen and reach hazardous lebels. Three different responses were given offered, which were "No difference", "Reduced a bit" and "Did not go out at all". Questions on the physical emotional symptoms further required the subjects to report on their symptoms retrospectively two

weeks ago. Two weeks prior to the date of administration of the questionnaire was chosen as during that time the sky was still relatively clear in the vicinity of the university. Reponses were on a "Yes" or "No" basis. The questionnaire concluded with several open-ended questions on the subjects' opinions on the causes of the haze.

RESULTS

To answer the questions posed by the research hypotheses, a series of frequency tables were generated. The tables consisted of frequency counts and percentages that compared the data sets of the prevalence of physical and emotional problems 3 weeks prior to the haze, and in the last three days.

When the differences in the prevalence of physical symptoms in this sample were compared between 3 days (i.e., 9th, 10th and 11th August 2005) and 3 weeks ago (i.e., 18th July 2005), it would appear that the prevalence has increased for all physical symptoms (see Table 1). Itchy or red eyes (6.2% to 52.3%), itchy or running nose (12.7% to 54.9%), dry throat/cough (19.3% to 77.5%), headache (14.4% to 63.7%), nausea (3.6% to 16.7%), and fever (5.9% to 15%). It would appear that the three biggest increases in physical symptoms appear to be dry throat/cough (58.2%), headaches (49.3%) and itchy or red eyes (46.1%).

TABLE 1. Physical Health During the First Three Days (9th-11th August 2005) of the Haze as Compared with Physical Health 3 Weeks Ago (i.e., 18th July 2005)

Physical Symptoms	3 weeks ago (%)	First 3 days (%)	% Change (First 3 days – 3 weeks ago)
Itchy or red eyes	19 (6.2)	160 (52.3)	+ 46.1
Itchy or running nose	39 (12.7)	168 (54.9)	+ 42.2
Dry throat/ cough	59 (19.3)	237 (77.5)	+ 58.2
Headache	44 (14.4)	195 (63.7)	+ 49.3
Nausea (vomiting)	11 (3.6)	51 (16.7)	+ 13.1
Fever	18 (5.9)	46 (15.0)	+ 9.1

Subjects were asked about their emotional symptoms in the last 3 days and 3 week before the survey. The results indicated that there is a general increase in emotional problems between 3 weeks ago and 3 days ago (see Table 2). The results were as follow: "felt depressed" (12.1% to 36.3%), "no energy" (13.4% to 50.7%), "did not feel like doing anything" (17% to 62.4), "felt anxious and afraid" (22.2% to 6.2%), "had difficult sleeping" (11.8% to 30.7%), "felt agitated and irritable" (8.5% to 35.9%), and "had no appetite" (8.2% to 35.9%). According to the data, the three biggest increases in emotional problems were "did not feel like doing anything" (45.4%), "no energy" (37.3%) and "felt agitated and irritable" (37.3%).

TABLE 2. Emotions During the First Three Days (9th-11th August 2005) of the Haze as Compared with Emotions 3 Weeks Ago (i.e., 18th July 2005)

Emotional Symptoms	3 weeks ago (%)	First 3 days (%)	% Change (First 3 days – 3 weeks ago)
Felt depressed	37 (12.1)	111 (36.3)	+24.2
No energy	41 (13.4)	155 (50.7)	+37.3
Did not feel like doing anything	52 (17)	191 (62.4)	+45.4
Felt anxious and afraid	19 (6.2)	68 (22.2)	+16
Had difficult sleeping	36 (11.8)	94 (30.7)	+18.9
Felt agitated and irritable	26 (8.5)	140 (45.8)	+37.3
Had no appetite	25 (8.2)	110 (35.9)	+27.7

During the haze period, most people reduced their outdoor activities and generally did not go out at all (see Table 3). The results indicated that the most affected activity was "outdoor sports/ activities" (17.6% - reduced, 73.2% - no go out), followed by "eating out" (49.3% - reduced, 35.9% - no go out), "going shopping" (38.6% - reduced, 39.5% - no go out), "visiting friends" (37.9% - reduced, 36.9% - no go out), and "attending functions" (36.9% - reduced, 33.3% - no go out).

TABLE 3. Effects on Activities During the First Three Days (9th-11th August 2005) of the Haze Period

Activities	Response		
	No Difference (%)	Reduced (%)	No Go Out (%)
Eating Out	44 (14.4)	151 (49.3)	110 (35.9)
Outdoor sports/ activities	26 (8.5)	54 (17.6)	224 (73.2)
Going shopping	65 (21.2)	118 (38.6)	121 (39.5)
Visiting friends	74 (24.2)	116 (37.9)	113 (36.9)
Attending functions	90 (29.4)	113 (36.9)	102 (33.3)

When asked if there was any major stressful change in their lives, most subjects indicated that the changes seem to be mainly academically orientated (see Table 4). The two highest changes in their lives would be in the area of sudden increase in deadlines and work projects (30.1%) and exams stress (42.8%). This would be normal for university students given that the month of August is usually near the end of a semester and there are normally many deadlines due, and also may have exams taking place.

TABLE 4. Problem People Encountered During the First Three Days (9th-11th August 2005) of the Haze Period

	Yes (%)	No (%)
Sudden increase in deadlines and work projects	92 (30.1)	175 (57.2)
Family problems	20 (6.5)	248 (81.0)
Relationship problems	43 (14.1)	225 (73.5)
Exams stress	131 (42.8)	140 (45.8)
Commencing a new course or job	30 (9.8)	237 (77.5)
Recent financial problems	48 (15.7)	218 (71.2)

DISCUSSION

This study was set up to find out if there was a difference in behavioural and emotional during the period when there was a dangerous haze in Malaysia. The results of this study generally indicated that subjects had an increase in emotional and behavioural problems, negative physical symptoms. The results also indicated that subjects had a marked reduction in outdoor activities during the haze period. The ensure that it was the haze that was probably the main cause of the increase in problems faced by subjects, an investigation was carried out to see if there were other major stressors going on in their lives at the time. The results indicated that there were no major unusual stressors going on in the subjects lives, given that the subjects were students, other than academic deadlines and exams. It would thus appear that for this population of subjects, the haze was the major environmental factor taking place in the subject's lives, thus bringing about an increase in emotional, behavioural and physical problems.

The results of this study compared with those of pervious studies also indicated that a polluted environment results in an increase in more physical health related problems (Bladen 1983; Chen et al. 2004; Chew, Goh & Lee 1999). Other studies noted that the effects of pollution resulted in low mood (Rotton 1983), depression and schizophrenia (Briere, Downes & Spensley 1983), chronic bronchitis (Terry 1964; Aditama 2000), and asthma (Shima et al. 2002).

Whilst the current study sheds some light onto the lives of people living in polluted conditions, there are some factors that may limit the interpretation of the results. The first limitation concerns the sample. The current sample is taken primarily from an urban location and may not necessarily reflect that of a rural sample, especially where issues to do with leisure activities are concerned. Secondly concerns the use of retrospective data. It would have been more helpful if the study could have been repeated over a period of several weeks. However, given the unpredictability of the occurrence of the haze, the authors sought to using retrospective responses.

Much of the recommendations that arise from this study concern the field of public health. Firstly, public health campaigns need to inform people of the effects on both physical and mental health. Most messages concern physical health and the dangers of the haze. Very few studies address mental health, which would appear to be affected. People need to understand that during adverse physical conditions, tempers may rise, and behaviours may become erratic. This is especially important from the point of view of working scenarios where emotions may hamper already stressful and unhygienic working environments, and subsequently productivity declines. Thus, human resource departments need to inform managers of not just the negative physical health effects, but also of the changes in emotions and behaviours that may take place. As a conclusion, this study showed that the emotional and behavioural problems, were just as common during the haze, when compared with physical health problems. Whilst it is one in many studies it does shed light on a broad range of problems which health care and human resource departments need to be aware of and take precautions to minimize.

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APPENDIX 1

AIR QUALITY STUDY

Instruction: This is a study by the Dept of Psychology, Sunway University College which seeks to find out the effects of the haze on people. Please assist us by either filling in the appropriate answer, or circling one of the answers to the following questions.

Date : _____ August 2005

1. **Gender** : *Male* *Female*
2. **Age** : ____ years
3. **Occupational status**: *Student* *Administrative Staff* *Academic Staff*
4. Race : Malay Chinese Indian Caucasian
   Others, please specify _____

In the last **3 days**, how has the haze affected your carrying out the following activities:

5. Eating out *No difference* *Reduced a bit* *Did not go out at all*
6. Outdoor sports / activities *No difference* *Reduced a bit* *Did not go out at all*
7. Going shopping *No difference* *Reduced a bit* *Did not go out at all*
8. Visiting friends *No difference* *Reduced a bit* *Did not go out at all*
9. Attending functions (i.e., social/work) *No difference* *Reduced a bit* *Did not go out at all*

Have you recently experienced any of the following physical symptoms in the last **3 days**:

10. Itchy or red eyes *Yes* *No*
11. Itchy or running nose *Yes* *No*
12. Dry throat / cough *Yes* *No*
13. Headache *Yes* *No*
14. Nausea (vomiting) *Yes* *No*
15. Fever *Yes* *No*

Did you have any of these physical symptoms or illnesses **3 weeks** ago?

16. Itchy or red eyes *Yes* *No*
17. Itchy or running nose *Yes* *No*
18. Sore throat / cough *Yes* *No*
19. Headache *Yes* *No*
20. Nausea (vomiting) *Yes* *No*
21. Fever *Yes* *No*

Please state if you have had the following emotional symptoms in the last **3 days**

22. Felt depressed *Yes* *No*
23. No energy *Yes* *No*
24. Do not feel like doing anything *Yes* *No*
25. Feel more anxious and afraid *Yes* *No*
26. Have difficulty sleeping *Yes* *No*
27. Feeling agitated and irritable *Yes* *No*
28. Less appetite *Yes* *No*
29. Fever *Yes* *No*

Please state if you have had the following emotional symptoms **3 weeks** ago

30. Felt depressed *Yes* *No*
31. No energy *Yes* *No*
32. Did not feel like doing anything *Yes* *No*
33. Felt anxious and afraid *Yes* *No*
34. Had difficulty sleeping *Yes* *No*
35. Felt agitated and irritable *Yes* *No*
36. Had no appetite *Yes* *No*
37. Fever *Yes* *No*

Have you been experiencing any of the following problems in the last **3 weeks**:

38. Sudden increase in deadlines and work projects *Yes* *No*
39. Family problems *Yes* *No*
40. Relationship problems *Yes* *No*

41. Exams *Yes* *No*

42. Commencing a new course or job *Yes* *No*

43. Recent financial problems *Yes* *No*

44. When you think of the haze what do you worry about? _____

45. What/Who do you think is causing the haze? _____

46. What do you think should be done about the haze? _____

47. Please state where you live (i.e., PJ, Klang, KL) _____

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