

**PSYCHOLOGICAL PREPAREDNESS OF
BOMBA HAZMAT TEAMS IN WEST MALAYSIA,
FOR EMERGENCY HAZMAT RESPONSE**

By

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DEDICATION

This project is a part of the curriculum for the fulfilment of the requirements for the Degree of Master of Science in the Faculty of Engineering, Universiti Putra Malaysia.

It was conducted with the advice and under the guidance of the Supervisor, Ir. Fuad Abas.

The period of the study was from June 1999 to April 2000.

The existence of this study is a result of the willingness of many individuals from Bomba to take part in the survey.

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ABSTRACT

This is a study of the Psychological Preparedness of a group of 361 Bomba Hazmat personnel located in Penang, Selangor, Wilayah Persekutuan, Negeri Sembilan/Melaka, Johor and Terengganu. The group comprised of 130 subjects trained overseas or at the Akademi Bomba; and 231 trained at the local Bomba stations of the respective states. These were compared with a matched contrast group of 123 voluntary fire fighters in Sungei Way Free Trade Zone, Petaling Jaya, by age, gender, and rank.

The sample subjects had significantly higher psychological preparedness than the contrast subjects in all parts of the psychological skills tested.

The difference in psychological preparedness of the Hazmat personnel in Penang was significant compared to those from the other states studied. The sample subjects scored higher psychological skills in one or more parts of psychological skills in every state studied.

Also there was significant correlation between the level of education and the psychological preparedness of the sample subjects under study.

These findings gave rise to the following highlights:

- The most striking result was that Penang state's hazmat personnel were the most outstanding in psychological preparedness.
- An interesting result was the importance of education level in relation to psychological preparedness.
- The surprising result is the below par score of all Bomba hazmat personnel in the physical condition category

The importance of psychological training has never been so real to Bomba considering that the present fire service is not only involved in fire suppression activities but also has an increasing role in the delivery of rescue services and response to incidents involving hazardous materials. These Bomba activities and functions are directly related to stress and the emotional and psychological consequence of providing emergency services. Hence the psychological preparedness of these emergency personnel is crucial to the success of the Fire and Rescue Department (Bomba).

ABSTRAK

Kajian ini adalah mengenai persediaan saikologi kumpulan anggota-anggota Bomba Hazmat yang bertugas di Pulau Pinang, Selangor, Wilayah Persekutuan, Negeri Sembilan, Melaka, Johor dan Terengganu. Kumpulan-kumpulan ini terdiri daripada 130 anggota yang telah mendapat latihan luar negara atau di Akedemi Bomba dan Penyelamat; dan seramai 231 anggota yang telah dilatih di balai-balai Bomba dan Penyelamat di negeri-negeri yang berkaitan.

Perbandingan dilakukan dengan sekumpulan 123 anggota Bomba sukarela di Zon Perdagangan Bebas Sungai Way, Petaling Jaya berdasarkan kepada umur, jantina dan jawatan.

Sampel subjek menunjukkan bahawa mereka mempunyai persediaan saikologi yang lebih tinggi daripada subjek kontras di dalam semua bahagian ujian kemahiran yang dilakukan. Kajian menunjukkan dari segi persediaan saikologi, bagi anggota Hazmat di Pulau Pinang perbezaan adalah ketara berbanding dengan anggota daripada negeri-negeri lain.

Sampel subjek di dapati memperolehi markah lebih tinggi mengenai kemahiran saikologi di dalam satu atau lebih bahagian kemahiran saikologi di setiap negeri yang dikaji. Di samping itu, didapati terdapat kaitan ketara antara tahap pendidikan dan persediaan saikologi sample subjek yang dikaji.

Penemuan ini mengutarakan beberapa perkara seperti berikut:

- i. Keputusan yang memberangsangkan adalah di mana anggota-anggota Hazmat Bomba Pulau Pinang merupakan yang terbaik dari segi persediaan psikologi.
- ii. Keputusan yang menarik adalah mengenai dengan kepentingan tahap pendidikan dan kaitannya dengan persediaan psikologi.
- iii. Keputusan yang mengejutkan adalah mengenai anggota Hazmat di negeri-negeri lain yang mempunyai kategori keadaan fizikal yang berada di bawah par.

Keperluan kepada latihan psikologi sepatutnya tidak diambil mudah oleh pihak Bomba dan Penyelamat memandangkan situasi sekarang dimana Jabatan Bomba dan Penyelamat bukan sahaja terlibat dalam aktiviti pemadaman kebakaran tetapi telah ditingkatkan peranannya kepada tugas menyelamatkan dan tindak balas kepada insiden yang melibatkan bahan-bahan berbahaya.

Oleh itu fungsi dan aktiviti Jabatan Bomba dan Penyelamat ini sebenarnya berkaitan secara langsung dengan tekanan (stress) psikologi dan gangguan emosi apabila memberikan perkhidmatan kecemasan. Oleh itu persediaan psikologi kepada anggota-anggota kecemasan ini adalah sangat penting (crucial) bagi memastikan kejayaan Jabatan Bomba dan Penyelamat, Malaysia.

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Last but not least, Dr. Mohd Daud's constant reminder and positive stress exertion was indeed very beneficial: ...without stress, there would be no change, growth, or productivity (Selye, H. 1956).

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CHAPTER I

INTRODUCTION

1.1. Historical background of Bomba Hazmat Teams

The formation of Bomba Hazmat Teams in Malaysia was due mainly to the disastrous fire and explosion incident at the Bright Sparklers Fire Crackers factory at Sungai Buloh, Selangor in 1991, the chronological event of this incident and the subsequent development are as follows (Bomba, 1998):

- 1.1.1 7 May 1991 – Fire and explosion of Bright Sparklers Fire-Crackers factory, at Sungai Buloh, Selangor sacrificing 20 and injuring 103 people.
- 1.1.2 Due to this incident, the Malaysia government established a Royal Commission to investigate this incident, and to give comment so that this incident would not happen again in the future.
- 1.1.3 One of the recommendation made was as follows: -

The need of continuous training for hazmat emergency service and procurement of equipment suitable for the purpose.

1.1.4 Year 1993 – A total of 12 personnel were sent to attend the Hazmat course at Fire Service College, Moreton in-Marsh, England for five weeks as a beginning of the formation of the Hazmat Team at Bomba, Malaysia.

1.1.5 Year 1995 – Bomba Malaysia purchased 5 units of Hazmat vehicles by means of 'CBU' (Complete Build-up Unit), from Finland and are placed at the state as follow: -

- Wilayah Persekutuan, Kuala Lumpur
- Selangor
- Pulau Pinang
- Johor
- Terengganu

1.1.6 Year 1995 – The government of Pulau Pinang separately sponsored RM3 million for hazmat equipment for Bomba, Pulau Pinang, consisting of the following:

- 1 unit of Hazmat vehicle
- 1 unit of Prime Mover and 2 pods, that is, Movable Control Room and Tripple Agent which contains 4,500 litres of 800 kg foam dry powder and 1,000 litres water tank.
- 1 unit of 4 wheel patrol car.

1.1.7 Year 1998 – Bomba Malaysia bought additional 2 units of Hazmat vehicle and placed them at Bomba, Negeri Sembilan and Akademi Bomba Malaysia, Kuala Kubu Bharu, Selangor.

1.1.8 Training Hazmat Course – As of date, out of a total strength of 8,500 Bomba officers and fire fighter, 1,081 have been trained, and attended Hazmat training course. Out of this, 34 of them were trained overseas (England, Finland, Sweden and Japan), and the rest of them were trained locally at The Akademi Bomba, and the individual Fire Station in the states concerned. (Table 1.1)

Table 1.1 : BOMBA HAZMAT OPERATION STATISTICS IN MALAYSIA, 1994 - 1999

NO.	STATE	YEAR ESTABLISHED	TOTAL TRAINED MEMBER	COURSE		**ABDPM (Academy)
				OVERSEAS ***	DOMESTIC (Bomba Station)	
1	Perlis	1995	6	-	-	6
2	Kedah	1995	11	1	-	10
3	Perak	1994	85	1	75	9
4	* Pulau Pinang	1994	160	3	111	46
5	* Wilayah Persekutuan	1994	225	4	161	60
6	* Selangor	1994	172	1	110	61
7	* Negeri Sembilan	1994	20	2	2	16
8	Melaka	1994	80	1	70	9
9	* Johor	1994	69	2	30	37
10	Pahang	1994	10	1	-	9
11	* Terengganu	1994	162	2	109	51
12	Kelantan	1994	9	-	-	9
13	Sabah	1994	11	-	-	11
14	Sarawak	1994	10	2	-	8
15	Labuan	1994	5	-	-	5
16	ABDPM Kuala Kubu Bharu, Selangor	1994	46	14	-	32
	TOTAL		1,081	34	668	379

NOTE:

* States that have Hazmat vehicle (1 unit for each state except Pulau Pinang).

Pulau Pinang has 2 units, one of it was sponsored by state government.

** Academy of Fire and Rescue Department, Malaysia

*** England, Sweden, Finland and Japan

Source: Operation Division, Fire Rescue Department of Malaysia, Kuala Lumpur

A Royal Commission of Enquiry set-up by the government to investigate the Bright Sparklers incident made the following recommendations to prevent similar incident from occurring again:

- The establishment of a standardised definition of dangerous chemicals to avoid confusion amongst various ministries and agencies.
- The establishment of a uniform signage, similar to the HAZCHEM Coding, for the storage, transportation and sales of dangerous chemicals.
- The establishment of a dangerous chemical information centre available to the public to be located at the Ministry of International Trade and Industry.
- The establishment of a National Council for Hazardous Industries for monitoring and control, and the delegation of responsibilities in managing industrial disaster.
- The strengthening of decision-making relating to disaster management at three levels, namely, at national, state and local authority levels.

- The formation of State Industrial Disaster Committees to prepare an emergency plan in the event of any disaster.

Major incidents like the Choon Hong III Vessel at Port Klang on 20th June 1992 (Bomba 1992), further highlighted the need for urgent measures to improve disaster management in the country. One of these was to provide continuous training for emergency services personnel, especially those belonging to Bomba's Hazmat Teams. Another was to ensure the availability of appropriate equipment for handling hazmat emergencies.

Since then, no effort has been spared by Bomba to provide specialised training for their officers and the fire-fighters, whether overseas or at their academy as well as at training centres located at the State Bomba premises.

As a matter of fact, the need to have up-to-date training facilities and curriculum has prompted the government to upgrade the once Fire Training College at Kuala Kubu Bahru to an academy - Akademi Bomba dan Penyelamat Malaysia (ABDPM).

All these efforts are geared towards providing the country with emergency teams who are well trained and prepared to handle hazmat emergencies. As a general rule, one is more confident when better prepared.

1.2. Observation and preliminary information gathering

In this study, the main focus is placed on the Bomba stations where most of the hazmat team members are located mainly in the state headquarters, or in the vicinity of the petrochemical complexes, like Kertih in Terengganu and Pasir Gudang in Johor.

Bomba stations located remote from the headquarters normally do not have hazmat personnel per se, and they rely on the full support of the headquarters' hazmat personnel in the event a hazmat emergency. The level of hazmat personnel at these remote stations are normally at the so-called first responder at the awareness level, as defined in the National Fire Protection Association (NFPA)'s NFPA 472, "Professional Competence of Responders to Hazardous Materials incidents, 1992 (National Fire Protection Association, NFPA 472, 1992)". This is also stipulated under "Emergency Response Rules/Certification Levels under 29 CFR 1910.120" (OSHA, USA).

At this level, the first responders are those persons who, in their normal duties, may be the first on the scene of an emergency involving hazardous materials. First responders at the awareness level are expected to recognise hazardous materials presence, protect themselves, call for trained personnel, and secure the area. In this respect, they play a secondary role in any hazmat emergency.

Immediately above this level, there is the first responder at the operational level. They are those persons who respond to release or potential releases of hazardous materials as part of the initial response to the incident for the purpose of protecting nearby persons, the environment, or property from the effects of the release. They shall be trained to respond in a defensive fashion to control the release from a safe distance and keep it from spreading.

The locations of major Bomba stations with respect to the distance from the Bomba headquarters in the different states are shown in APPENDIX 1.

The hazmat training and response networking was particularly true only in Penang, and it was pointed out in the study on "Kesediaan Pasukan Hazmat Negeri Pulau Pinang Menghadapi Insiden Bahan Kimia Berbahaya" (MD. Salleh bin Sarbini, 1999), where the basis of training for all Bomba personnel involved "multi-skilled" training, including Hazmat training, for both the levels, to handle all types of emergencies, the routine and the hazmat.

In the area of providing hazmat training and the selection process of the hazmat personnel, much is left to the individual state concerned, where the head of operation division of the Bomba headquarter in the state will organise and conduct hazmat courses to train the local personnel who have no opportunity to be trained by the Akademi Bomba.

From the unstructured interviews with the different state directors, and their operation officers (Tuan MD. Salleh bin Sarbini, Penang; Tuan Hamdan Daud, Kertih; Tuan Hussin and Tuan Yussof, Melaka; Tuan Khirudin Drahman @ Husaini, Kuala Kubu Bahru; Tuan Borhan, Shah Alam; Tuan Norizam Sulaiman, Kuala Lumpur; Pers. Comm.), the general views regarding the above is summarised as follows:

- Hazmat training program/schedules are different in each state, each is tailored to the requirement of the state concerned by the operation office in the state Bomba headquarter.
- Bomba's Academy Hazmat training programs provide only *basic* and *general* theoretical and practical training to the participants; and mainly deal with learning the use of special equipment for Hazmat response, such as, SCBA (Self-Contained Breathing Apparatus), etc.

- Hazmat personnel are not specially screened and selected with a set of pre-requisites, but chosen from the existing firemen and new recruit alike (based on the knowledge capability and years of experience with Bomba).
- Individual state's training programs are determined by each state operation officer who has himself already undergone hazmat training in Akademi Bomba or overseas.
- Generally speaking, hazmat personnel trained by Akademi Bomba or Bomba stations will acquire similar type of hazmat knowledge in their training.
- Only hazmat trained personnel in Bomba stations (except Penang state) will attend to (respond) hazmat emergencies. Non-hazmat trained Bomba personnel will not be directly involved. This has already been mentioned in Section 1.2.
- Generally speaking, one can consider that only one level (except Penang state) of Hazmat personnel are trained for Hazmat emergency response, even though there are different functions/operations to be performed in the event of a hazmat emergencies. These functions/operations can include any or all of the following (Borhan, pers. comm.):

- Incident command
- Safety and evacuation
- Weather status
- Decontamination
- Fire fighting
- Medical (basic first aid)
- Media liaison
- Mitigation
- Welfare/logistics

It is interesting to note that the detailed hazmat training programs, left to each state, can be quite different in their contents, for example, the training courses (APPENDIX 2) organised by Penang are quite different from that for Melaka, (APPENDIX 3). In contrast, the training program summary (APPENDIX 4), organised by the Akademi, is also different.

Generally, it can be concluded that all hazmat training programs focus on the theoretical and practical part of hazmat emergencies, where maximum efforts are placed on the physical aspects in the training programs. Psychological or mental training element has not been included in the hazmat training program by Bomba thus far.

1.3. Problem Definition

With the inception of Hazmat Teams in Bomba since 1994, there is a total of 239 Hazmat incidents, with 10 people dead and 16 injured (Fire and Rescue Responders, 1998)

The urgency to train the Hazmat personnel are always great, and the fact that the Akademi Bomba could not train fast enough such personnel to cater for the ever increasing hazmat emergencies poses a real challenge. The alternative hazmat training provided at the local fire stations (mainly at the state Bomba headquarters) to train the fire-fighters, has helped to overcome this shortage. In all the training courses, the personnel are not trained for mental preparedness to handle the so-called emergency service stress which are experienced by all emergency services personnel, including the Bomba hazmat team members.

As mentioned in Section 1.2, a majority of the Hazmat training programs focus on the physical aspects of responding to hazmat emergency. This training is mostly based on the contemporary emergency service philosophy where knowledge base, techniques and strategies are most prominent in the training curriculum. This has been validated in the study conducted by Mr. MD. Salleh bin Salleh bin Sarbini (MD. Salleh, 1999) mentioned in the same section.

Currently, no studies have been done on the psychological preparedness of the Bomba hazmat teams' members by the Bomba, Malaysia, or any other outside institutions or agencies in the country. But the fact remains that emergency services personnel are subjected to the stresses of life, because of the nature of their work, and suffer the effects of being exposed to excessive danger, destruction and human misery.

Interestingly, such a study was carried out in the Camp Hill Fire Department, Camp Hill, Pennsylvania, USA, by members who had taken part in the initial trials of the so-called Psyche Response Training to provide feedback and acceptance of psychological consultation. The study was conducted by the Psychological consultant, Camp Hill Fire Department, Camp Hill, P.A. (Michael T. Asken, Ph. D., 1990). Attempt to obtain a copy of the result has not been successful at the time of writing.

1.4. Objective of Study

There is increasing evidence to support the need to address psychological preparedness in emergency response. The number and nature of encounters that can be traumatic to responders, such as length of duty, death or injury, death of a child, mass casualties, entrapment, and so on, have been well described in the emergency literature. The National Fire Protection Association of USA (NFPA 1500, 1992) has recognised the need for attention to stress in the fire service. In Chapter 9, Member Assistance Program, it is stated that, "The Member Assistance shall provide health promotion activities that identify physical and mental health risk factors....."

The objective of this study is to determine whether the Bomba Hazmat Teams in each West Malaysia state are psychologically prepared for hazmat response in the event of hazmat emergencies. The record objective is to determine whether or not there is a significant mean difference, in the psychological preparedness of the hazmat teams among the different states.

It is the intention of this study to find the possible relationship between the different levels of preparedness with some demographic elements like age, education, rank in the service and years of experience.

The result of the finding could also provide a benchmark for Bomba to provide the hazmat team members with a basic understanding of stress, to encourage the productive use of positive stress, and to provide strategies and tactics of stress survival that can reduce the harmful effects of distress, the negative aspects of stress.

Last but not least, a similar study is currently undertaken by another student on the psychological preparedness of voluntary fire-fighters in the Sungei Way Free Trade Zone. The result of this study shall be used as a contrast group to compare the level of psychological preparedness between the Bomba hazmat teams and the voluntary fire fighters, and also to determine whether or not there is significant mean difference between these two contrasting groups of emergency personnel.

1.5. Scope, Limitations and Definitions

This study shall only deal with the Bomba Hazmat Teams, whose members, both officers and fire fighters are trained in hazmat courses, whether overseas or in the Akademi Bomba at Kuala Kubu Bahru, as well as in the local Bomba stations in each state. Non-hazmat trained Bomba officers and fire fighters, whose duties may only involve fire fighting, directly or indirectly in emergency hazmat response, are excluded in this study. They could be, however, be used as control (contrast) group since their population characteristics and parameters are quite the same as those of the Bomba hazmat team members.

This study also limits itself to dealing with the Bomba hazmat teams who are attached to a fire station having hazmat vehicle. This is confined to the following states:

- Wilayah Persekutuan, Kuala Lumpur
- Selangor
- Pulau Pinang
- Johor, and
- Terengganu

The above forms the sampling frame for the study which is listed in Table 1.2.

**Table 1.2: BOMBA HAZMAT OPERATION STATISTICS
IN MALAYSIA, 1994 - 1999
(States having Hazmat Vehicle)**

☆ STATE	☆ COURSE		
	OVERSEAS ***	**ABDPM (Academy)	DOMESTIC (Bomba Station)
* Pulau Pinang	3	46	111
* Wilayah Persekutuan	4	60	161
* Selangor	1	61	110
* Negeri Sembilan	2	16	2
Melaka (NOTE 3)	1	9	70
* Johor	2	37	30
* Terengganu	2	51	109
TOTAL	15	280	593

NOTE:

- (1) States that have Hazmat vehicle (1 unit for each state except Pulau Pinang)
 - * Pulau Pinang has 2 units, one of which was sponsored by state government.
 - ** Academy of Fire and Rescue Department, Malaysia.
 - *** England, Sweden, Finland and Japan
- (2) All Hazmat Teams established in 1994.
- (3) Melaka uses hazmat vehicle from Negeri Sembilan to handle their rapidly developed protochemical Industrial estate in the state.

☆ Source: Operation Division, Fire & Rescue Department of Malaysia, Kuala Lumpur.

In this study, the following definition regarding the so-called different levels of hazmat personnel are taken into account in the data collection phase:

In the previous study on “Kesediaan Pasukan Hazmat Negeri Pulau Pinang Menghadapi Insiden Bahan Kimia Berbahaya” (MD. Salleh bin Sarbini, 1999), it was reported that the Penang Bomba had divided their hazmat personnel to two levels, namely, First Responder Awareness Level, and First Responder Operational Level. These different levels of hazmat personnel, reported by Mr. MD. Salleh bin Sarbini, is reproduced here, in Fig 1.1, for easy reference. It is to be noted that this only applies to Penang state.

However, from the unstructured interviews mentioned in Section 1.2, it was concluded that only one level of hazmat personnel are trained for hazmat response, even though there are different functions and operations involved. The Bomba hazmat trained personnel shall be defined as being one who has undergone hazmat training in any of the following locations:

- Overseas
- In the Akademi Bomba, Malaysia
- In Bomba Headquarters of every state having hazmat vehicle.



Fig. 1.1: Emergency Response Rules/Certificate Level Under 29 CFR 1910.120 (OR NFPA 472)

In short, as far as the psychological preparedness is concerned, all state directors, operation officers generally concurred that all hazmat personnel, involving in operational or functional hazmat activity at hazmat site, will experience the same emergency services stress. The same high level of psychological preparedness should be possessed by every hazmat team member to help their peak performance capability in responding to any hazmat emergency.

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