



MY9700825

**CURRENT ENVIRONMENTAL HEALTH PROBLEMS
AND INITIATIVES IN MALAYSIA***by*

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Abstract

Technological changes, both as an impetus and a result of development, inevitably impinges on the environment resulting in the destruction of the eco-system and the resources by which man's existence depends. The resulting health consequences are often not obvious and are difficult to address.

Malaysia is no exception and environmental stress is already evident. The high technological input that has transformed Malaysia into a leading producer of technology-intensive products has brought about unavoidable deterioration of rivers, coastal water, the urban ecology and the atmosphere in industrially active areas.

Although economic progress has resulted in improved health status in terms of communicable and immunisable diseases, the stress of modern living and environmental degradation has resulted in the increased incidence of non-communicable diseases which are known to be associated with changing lifestyles. The paper will discuss the various environmental changes that have taken place and the change in health status of the people in Malaysia.

INTRODUCTION

Health has been defined by WHO as " a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity ". While this definition may be idealistic, it is a recognition of the importance of health to the social, mental and economic development of the individual and the community at large. A healthy

population, is therefore an important prerequisite and an important renewable resource for the attainment of a nation's economic and developmental goals (NHMRC, 1992).

Development is a desired goal of any nation, as it brings with it an elevation of the quality of life as well as improved health status and material well-being. Nevertheless, technological changes and development inevitably impinges on the environment, destroying the eco-system and the resources by which man's existence depends. The resulting health consequences are often not obvious and are difficult to address. However, there is increasingly a global recognition and move towards sustainable development that will strive to preserve the ecological base for future generations and hence protect the health of the people.

Thus, the scope of environmental health is wide, encompassing a range of public health matters from the control of traditional infectious disease to chemical poisoning, air quality, sewage treatment, urban health and accidents (Breslin, 1993).

Malaysia, as a developing nation, has progressed from its economic standing as a producer of raw materials and commodities into a leading exporter of technology-intensive products. The process of development, spanning from the 1950s with discovery of tin deposits, to the present day's high technological input into development has brought about unavoidable environmental stress. Rivers, coastal waters, the urban ecology and the atmosphere in industrially active areas have begun to exhibit signs of deterioration.

In the belief that poverty is a cause as well as a consequence of environmental degradation and deterioration of environmental health, Malaysia's commitment to development is not confined to economic progress, but to development in all other areas, namely, social, political, spiritual, psychological and cultural areas. There is also a recognition of escalating health costs, which includes actual medical costs as

well as the costs involved in loss of productivity to the nation. Thus its development strategy aims to encompass both its people and the natural environment.

This paper, therefore aims to highlight the current environmental problems and its consequences on health. Initiatives to safeguard further deterioration and to promote sustainable development will also be discussed, both of which will provide a general background and setting for further deliberations during this conference and the workshop sessions.

ENVIRONMENTAL CHANGES OF HEALTH CONSEQUENCE

Water Pollution

The original opening up of land for tin mining, rubber plantations and other cash crops has been intensified in the last two decades for housing and infrastructure development and setting up of more factories. This opening up of land, especially in rain shelter areas has aggravated the siltation problem which first became noticeable during the 1920s and 1930s (NSCED, 1992).

The suspended solid index for 1993 (fig.1) shows that 56% of rivers surveyed were polluted, (Norhazni, 1994) as compared to 41% during the 1985-1989 survey (NSCED, 1992). Among the effects of this pollution are serious flooding in low-lying areas, frequent occurrences of flash floods especially in urban areas, depletion of aquatic life, problems of water supply and hindrance to economic activities such as fishing.

The consequence of these effects are varied and range from fatalities during floods to disease as a result of poor health care with loss of livelihood, over-crowding and lack of amenities in shelters and contamination of water supplies. Another consequence, often overlooked, is the mental well-being of people whose lives are constantly threatened by the imminent danger of floods.

Of greater importance is the pollution and contamination by sewage and animal wastes, which ranks as the major contributor to river pollution (DOE, 1992). An evaluation of raw water quality data from 1988 to 1992 of three major water intakes in the Klang Valley, shown in figs. 2-4, indicated an increasing trend of bacteriological contamination (Ong, 1993). In addition, table 1 shows that approximately 33% of 9,469 raw water samples analysed contain bacteriological indicators in excess of WHO standards for potable water supplies (ED, 1992; Pillay et al., 1992). Although vigilant surveillance of drinking water have ensured the safety and potability of water supplies in 98% of the samples analysed (table 2), there have nevertheless been episodes of waterborne disease outbreaks in the past, some of which included:-

- *2,6000 cases of gastroenteritis in Seremban in 1982;*
 - *81 cases of infectious hepatitis in Raub in 1987;*
 - *940 cases of infectious hepatitis in Kota Belud in 1988;*
 - *300 cases of typhoid fever in Johor Bahru in 1990.*
- (ED, 1994; ED, 1993)*

The heavy metal pollution detected in several rivers (Norhazni, 1994) have also resulted in pollution of drinking water (ED, 1993). While cases of heavy metal pollution remain isolated and confined to specific water supply systems, the potential health risks of neurological disorders due to lead, itai-itai due to cadmium poisoning etc. as has been recorded in other countries must not be discounted.

As a consequence of river pollution and contamination, monitoring of coastal waters have shown elevated levels of heavy metals and faecal coliform. The highest number of samples containing mercury were recorded in the states of Perak, Pulau Pinang, Kedah, Selangor and Negeri Sembilan while significant levels of lead were found along the coasts of Sabah, Johor, Perak, Pulau Pinang and Kelantan (DOE, 1992).

This environmental degradation will not only affect the fishing industry in national economic terms, but will affect the livelihood of fishermen, 83% of whom are supported by inshore fish landings (NSCED, 1992). The potential loss of livelihood together with the bacteriological contamination and bio-accumulation of these metals in the food chain will have serious health impacts.

It must also be borne in mind that faecal pollution will also contribute viral pathogens which include those responsible for viral gastro enteritis and infectious hepatitis. Although numbers of viral particles in sewage will be lower than those of faecal coliforms, their potential for disease is higher than bacteria because of their longer survival rates (Ayres, 1985).

Air Pollution

Air pollution is another major concern which has a high potential for deleterious effects on health. Increased urbanisation, human activities and the changing nature of urban settings as a result of development have also resulted in increased occurrences of urban heat islands.

Although the problem of air pollution is still largely localised in nature, it is nevertheless a matter of concern. While the rise in particulate matter have been attributed to forest fires and volcanic eruptions in neighbouring countries, the large increase in number of motor vehicles in Peninsular Malaysia from 670,000 in 1970 to 5.5 million in 1990 is the main cause of high particulate matter in congested industrial and urban centres. During the last haze episode in October 1991, Kuala Lumpur recorded a level of 340 ug/m³, which far exceeds the recommended Malaysia Daily Guideline (DOE, 1992).

The total number of diseases of the respiratory system admitted to government hospitals in Malaysia have also seen an increase from 76,709 cases in 1988 to 84,127 cases in 1992 (IDS, 1994). Although no studies have been carried out to link this increases in respiratory diseases to increased air pollution, a survey carried out among traffic policemen indicates a link between respiratory, skin and eye irritations due to high exposure levels of air pollutants (NST, 1993).

It is perhaps the fact that a large percentage of the population in urban centres spend the majority of their time indoors, that the health effects of increased air pollution have not be adequately established. This now brings to focus the problem of indoor air pollution.

A preliminary survey conducted by the Ministry of Health in 1991 on 5 hospitals and 6 hotels in the Klang Valley shows that colonisation of cooling towers by *Legionella* organisms is a problem that needs to be addressed. 51% of the samples collected were tested positive for *Legionella* organisms while 46% of these positive samples were confirmed as *Legionella pneumophila* serogroup 1 which is responsible for 90% of all Legionnaire's disease infections. Although the study was unable to establish a link between the legionella colonisation with the incidence of pneumonia cases, the serological survey nevertheless indicated background exposure (Siru, et al, 1994).

Noise Pollution

Increased industrial activities and vehicular traffic have given rise to noise pollution which, until the 1980s, had not been a significant problem. In 1991, noise complaints constitute about 13% of the total pollution complaints received by the Department of Environment (DOE). Fig. 5 shows the various sources of noise complaints, with industrial noise amounting to 83%, while the remainder 17% was made up of construction noise, traffic noise, and community noise in descending order of contribution (DOE, 1992).

Noise pollution is increasingly being recognised as a matter of concern, because of possible health and psychological effects.

Solid Waste Pollution

The rapid pace of industrialisation in the past two decades has resulted in the accumulation of toxic and hazardous wastes. These wastes are generated by various industries, notably from the electronics, chemical and chemical-related industries. A survey carried out in 1983/84 shows the electronics industry to be the main

contributor, accounting for 52% of toxic and hazardous waste accumulated in the country. This, as shown in fig. 6, was followed by the metals and electroplating industries which accounted for 14% followed by chemical, rubber, plastics, printing, packaging, tannery and pharmaceutical industries (NSCED, 1992).

Urbanisation

Although the population growth in Malaysia is proximately 2.4% per annum, the rural-urban migration has resulted in a 50.6% increase in urbanisation. This rapid urban population growth seen in 1991 as compared to 34.2% in 1980 is a result of economic growth and development which has brought with it job opportunities for the people (NSCED, 1992). This rapid urban growth as against scarcity of land and resources has resulted in a fast multiplying squatter population in major cities and towns. This will have its impacts on health, social and the mental well-being of the people.

HEALTH STATUS

Malaysia faces the challenge of combating the traditional diseases associated with water and sanitation problems as well as the modern day diseases associated with changing lifestyles. While improved economic status has resulted in reduction of food and water-borne disease and immunisable diseases such as measles, there is nevertheless an increase in non-communicable diseases.

Fig. 7 and 8 shows the declining trends of water-borne diseases and immunisable diseases, which are a direct result of improved food hygiene, water and sanitation facilities and improved health care programmes.

Improved economic status has resulted in more automation, change in diets, sedentary life but at an increased pace. These changes in lifestyle has inevitably resulted in various undesirable health manifestations. Cardiovascular disease, for example, is now the primary cause of morbidity and mortality with 28% of deaths in Peninsular Malaysia attributed to cardiovascular disease in 1991. The incidence rate for this disease has risen from 176.3 per 100,000 population in 1981 to 479.0 per 100,000 population in 1992 (fig.9) (Epidemiology, 1993).

Cancer is also emerging as one of the 5 public health concerns in Malaysia as a result of modernisation. In 1991, cancer contributed to 9.14% of mortalities as compared to 7.37% in 1975. The 7 main types of cancer are shown in table 3 (Epidemiology, 1993).

Road accident is another main public health problem in Malaysia. The rapid pace of development and the elevated socio-economic status of the people have resulted in increased vehicular traffic which has brought on an increase in the number of road accidents. The increase in number of motor vehicle accidents admitted to government hospitals in the 1970s as compared to the present day is substantial. Table 4 shows the sharp increase from approximately 8,000 accidents in 1970 to approximately 58,000 in 1992 (Epidemiology, 1993).

As a whole, incidence of all vector-borne diseases have decreased in 1992 compared to 1991. The exception is Japanese encephalitis which has increased by 6 times. The effects of urbanisation can be seen however, in the case of dengue fever which, as shown in table 5, has increased in incidence over the last 5 years (Vector, 1993).

The stress of urban living has also taken its toll on the mental health of the people. The number of mental disorders admitted to government hospitals in Peninsular

Malaysia has more than doubled since 1970. 13,117 cases were reported then as compared to 28,769 cases in 1992 (table 6) (IDS, 1994).

INITIATIVES IN ENVIRONMENTAL HEALTH PROTECTION

Since the 1970s, Malaysia's approach to environmental health protection has been based on the principles of sustainable development. This was outlined in a chapter on "Development and Environment" of the Third Malaysia Plan which covered the period 1976-1980. However strategies had already been adopted as far back as 1920 with the introduction of the Waters Enactment which was followed by the Mining Enactment in 1929. The various sector-related legislation that have been formulated over the years, extensive though they may be, does not facilitate an integrated approach towards implementation of environmental policy. As a result, a more comprehensive environmental legislation was conceived i.e. the Environmental Quality Act (EQA) 1974, updated in 1985 (NSCED, 1992).

The EQA, which forms the basic instrument for the attainment of national environmental objectives, employs a three-pronged approach in its administration (NSCED, 1992):-

- Control pollution and take remedial actions;
- Integrate environmental factors in project planning and implementation;
- Provide environmental inputs into resource and regional development planning.

To complement this strategy, the Environmental Impact Assessment (EIA) was established as an integral part of planning. To date, 17 regulations have been gazetted under the EQA.

Malaysia's approach to environmental protection is a dynamic one, with continued focus right through to the present Sixth Malaysia Plan and strategies are being continually improved upon and upgraded. Currently, there are over 40 environment-related legislation in Malaysia, some of which are under the purview of the State Government while others are either under the purview of the Federal Government or the concurrent responsibility of both the Federal and State Governments. Some of these legislation are preventive in nature while others are curative. A list of these legislation are given in appendix 1. Appendix 2 shows the delineation of environmental health activities among the various government agencies.

Public participation is encouraged by the government, although it has been slow to develop. The increased coverage by the press and electronic media on environmental problems have brought about greater awareness among the public resulting in increasing number of complaints on environmental transgressions. The increased awareness has also been as a result of education through the inclusion of "Man and his Environment" as a subject in upper primary schools as well as environmental courses at universities. Environment-oriented NGOs, besides being represented on the Environmental Quality Council, are also encouraged to engage in discussions and participate in related forums. In addition, the private sector, especially the larger firms are displaying greater awareness and participation on environmental matters (NSCED, 1992).

The strategies adopted to ameliorate the environmental problems of the various sectors will be discussed as follows.

Water Resources

A progressive water resources management plan has resulted in providing safe piped water supply to 84% of the population. This, together with improved sanitation in rural areas through the Rural and Environmental Sanitation Programme by the Ministry of Health as well as the implementation of sewerage schemes mutually support in disease control.

From the period covering 1986-1990, 9 out of 19 feasibility studies on centralised sewerage systems for towns were implemented, thus reducing the percentage of population lacking sanitary facilities from 10.2% in 1986 to 6.3% in 1990. The privatisation of sewerage systems and continuing sanitation programmes will enable almost the entire population to be equipped with acceptable facilities by 1995 (MSTE, 1994).

A National Water Council has also been proposed by the federal government to serve as an advisory body on water supply and management to the state governments (MSTE, 1994). A study has also been initiated to develop criteria and standards for river water quality and to classify rivers.

To strengthen the disease control component, a National Drinking Water Quality Surveillance Programme was launched in 1983 by the Ministry of Health. Its objective is to raise the standard of health of the people by ensuring the safety and acceptability of the drinking water provided to the consumer.

Environmental improvements to coastal villagers have also been initiated by the Ministry of Rural Development. The first stage covering 5 villages in East Malaysia and 11 villages in West Malaysia will not only improve the health status of the villagers but will result in reduced pollution loads on the coastal waters.

Various drought and flood mitigation procedures are in place which include river improvement works, earthworks control and flood relief procedures. To create a greater awareness on the need for water conservation, a "Love Our Rivers" campaign was launched in 1993 involving the participation of NGOs, the private sector, the general public and school children (MSTE, 1994).

Air Quality

To strengthen the remedial component of legislation, committees have been set up and plans initiated to study specific environmental problems. Some of these initiatives are as follows:-

- Haze Committee was set up in 1990 to identify source of haze and to recommend remedial measures to minimise air pollution.
- National Action Plan for Air Quality; a comprehensive plan for air quality.
- Study on Impact of Human Exposure Along the Roads.
- Epidemiological Study under the Haze Committee Working Group.

The Ministry of Health has also taken steps to improve indoor air management. Following the survey on legionella colonisation conducted in 1991, guidelines for maintenance of cooling towers in hospitals have been prepared by the Ministry of Health.

Solid And Toxic And Hazardous Waste

A comprehensive Municipal Solid Waste Management Action Plan was conducted in 1988 to include a combination of recycling, incineration and sanitary landfill. The privatisation of solid waste management services is also being considered in a feasibility study (MSTE, 1994).

Malaysia has taken steps to be a party to the Basel Convention and currently observes and complies with recommended guidelines on management and disposal of such waste. The Environmental Quality Regulations on scheduled waste enforced since 1989 set out the requirements for storage, collection, packaging, labelling, treatment and disposal of scheduled wastes. To complement these regulations, the Ministry of Health has prepared Guidelines for the Management of Clinical and Related Wastes in Hospitals and Health Care Establishments.

The establishment of an integrated facility for scheduled waste is progressing with identification of a disposal site and transfer stations (DOE, 1992).

Urban Management

The National Urban Policy is being formulated to ensure a more organised and integrated approach to improving human settlements so that spatial, sectoral and developmental aspects are taken into consideration (MSTE, 1994).

Other Sectors

Besides the various legislation and strategies discussed above, other sectoral policies have been implemented which indirectly protect environmental health by virtue of its

environmental component. Some of these sectoral policies and strategies, inter alia the National Forestry Policy, National Agricultural Policy, National Mineral Policy, Industrial Master Plan and a National Tourism Plan are in place. For better integration and coordination of these sectoral policies, a National Conservation Strategy-Towards Sustainable Development has been completed and is being considered for adoption. The various environmental objectives are also being integrated in a National Environmental Policy (NEP) (MSTE, 1994).

CONCLUSION

There has been, undeniably, a substantial amount of work that has gone into formulating and implementing the various policies and strategies discussed above. Nevertheless there is a need for research to provide inputs into planning. This will then provide a focus on priority areas so that planning and management within the constraints of finance, manpower and physical amenities can be maximised.

While research in various sector have been conducted by research institutions, government agencies and academics, a coordinated framework for research in environmental health is sadly lacking. The bridging of environmental research and health research needs to be strengthened as well and it is hoped that the conference and workshop will serve to open the communication lines between the two groups of experts in Malaysia.

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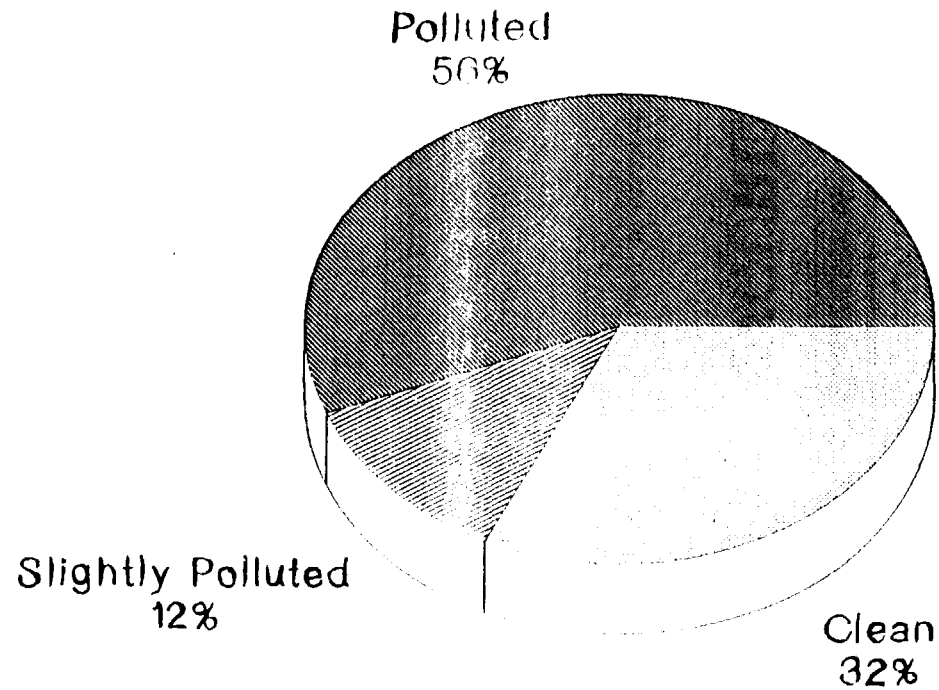
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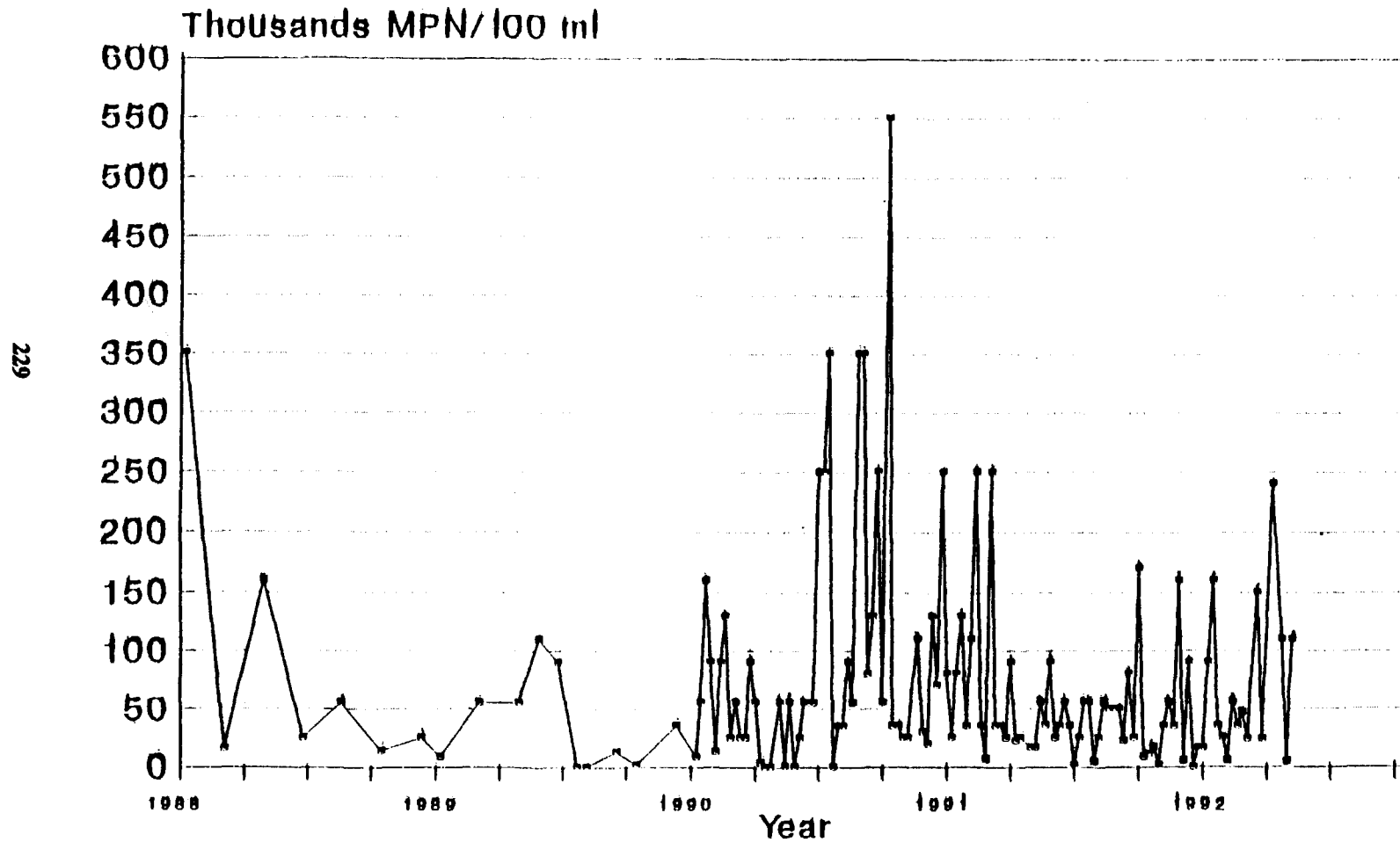
FIGURES

STATUS OF RIVER WATER QUALITY SUSPENDED SOLIDS



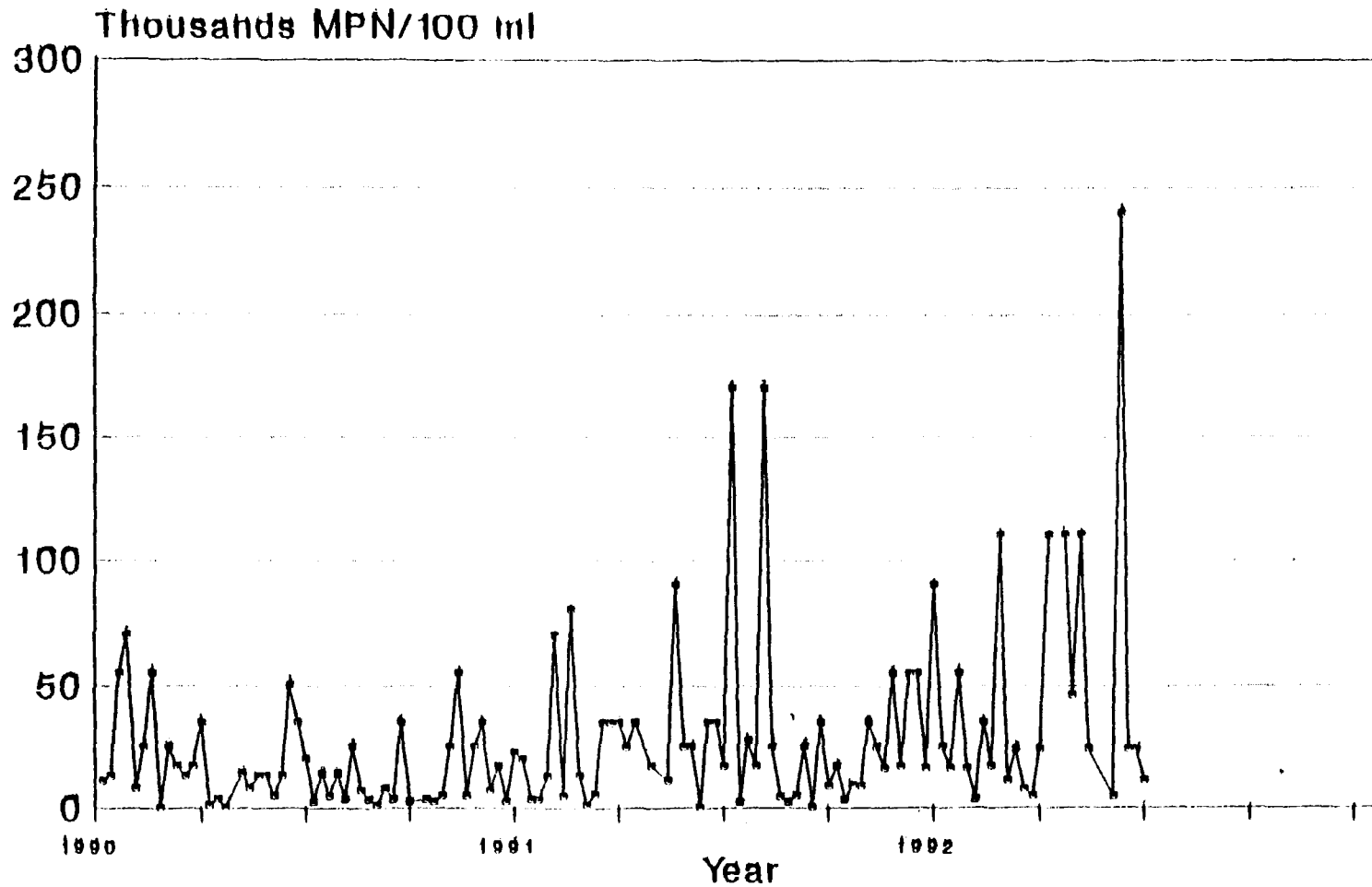
Source: Norhazni, 1994

Figure 3 : Time Series of Faecal Coliform observed at Cheras Intake
(Jan 1988 - April 1992)



(Source: Ong Sian, 1993)

Figure 4 : Time Series of Faecal Coliform observed at Bkt. Tampoi Intake
(Jan 1990 - April 1992)

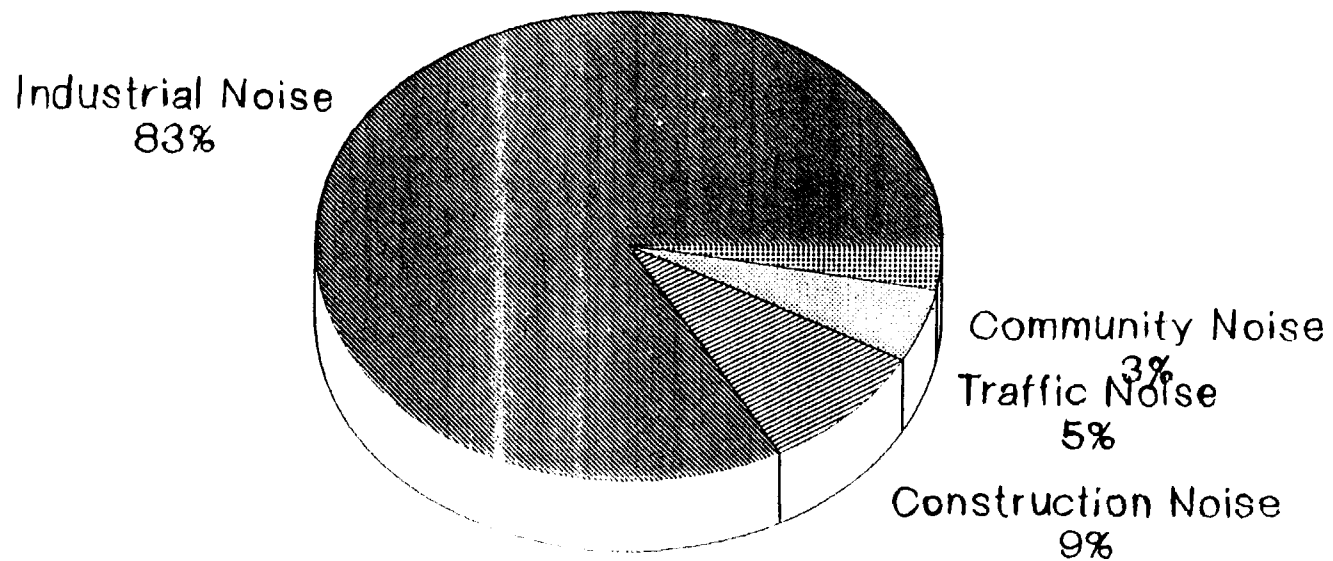


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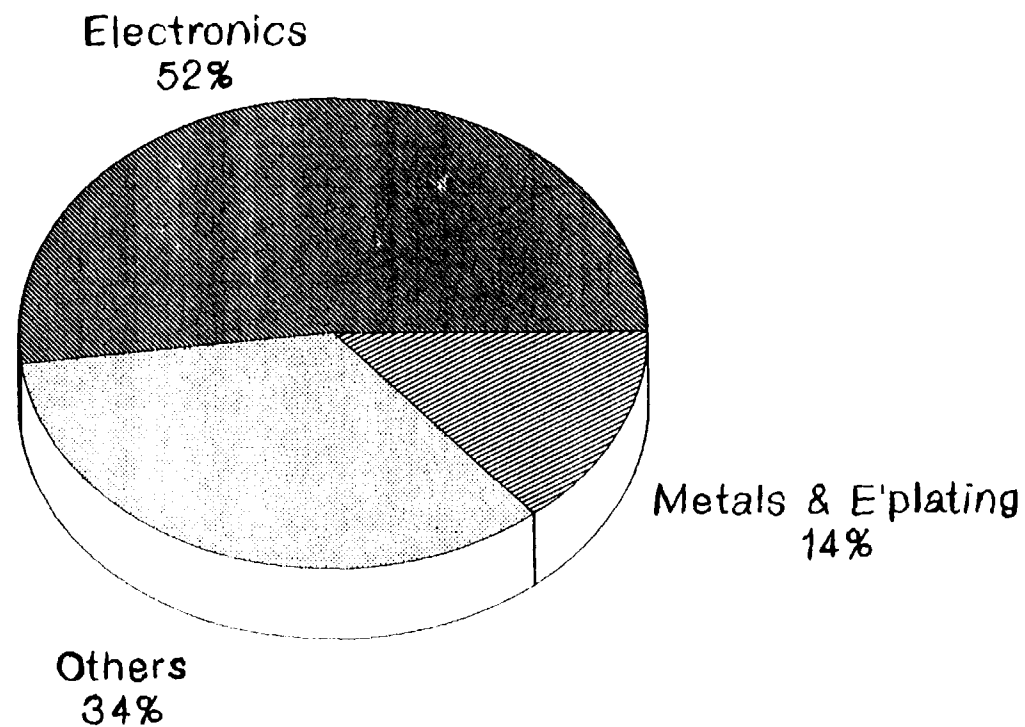
(Source: Ong Sian, 1993)

FIGURE 5

NOISE COMPLAINTS BY SOURCE

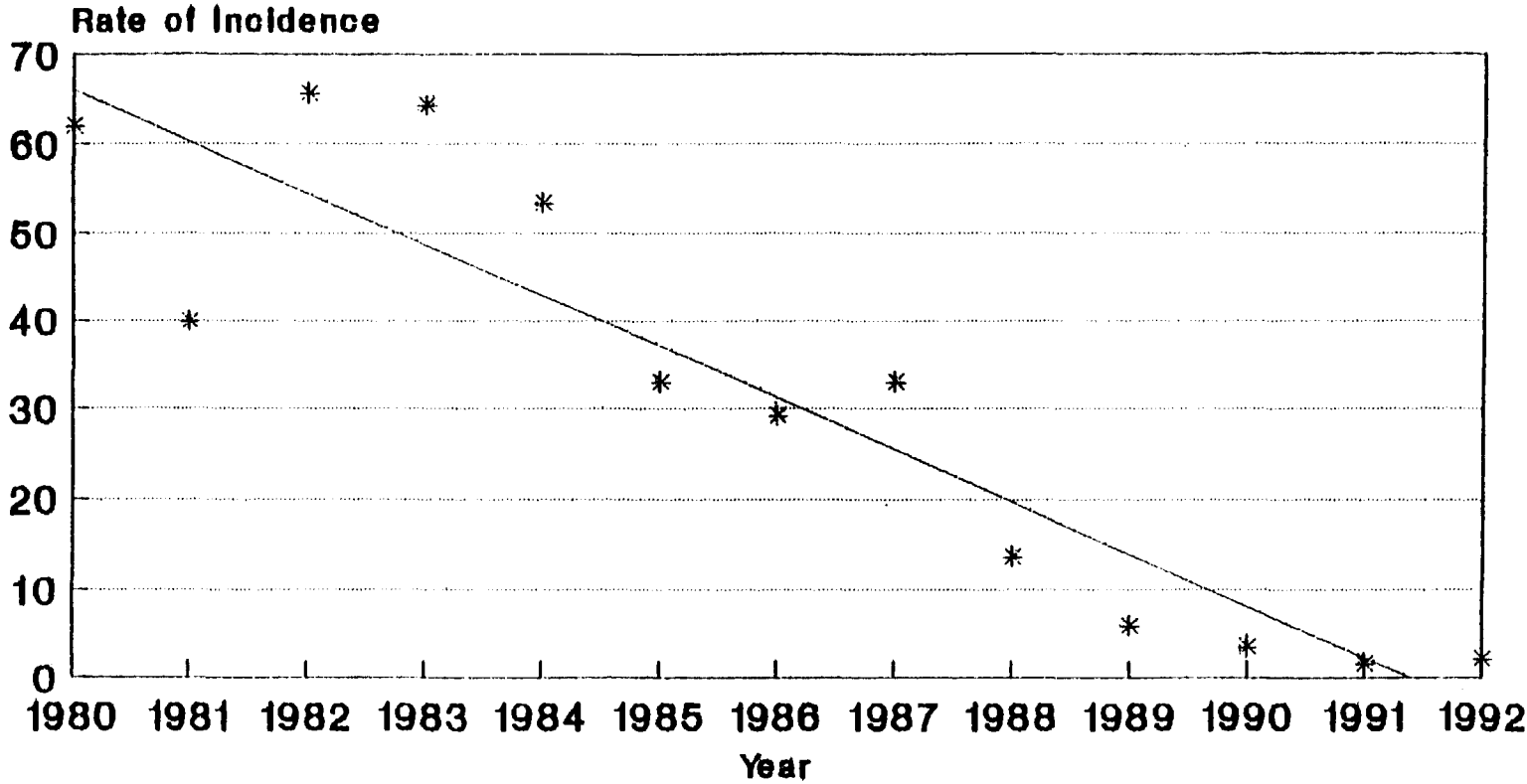


GENERATION OF TOXIC AND HAZARDOUS WASTE BY INDUSTRIAL SECTORS



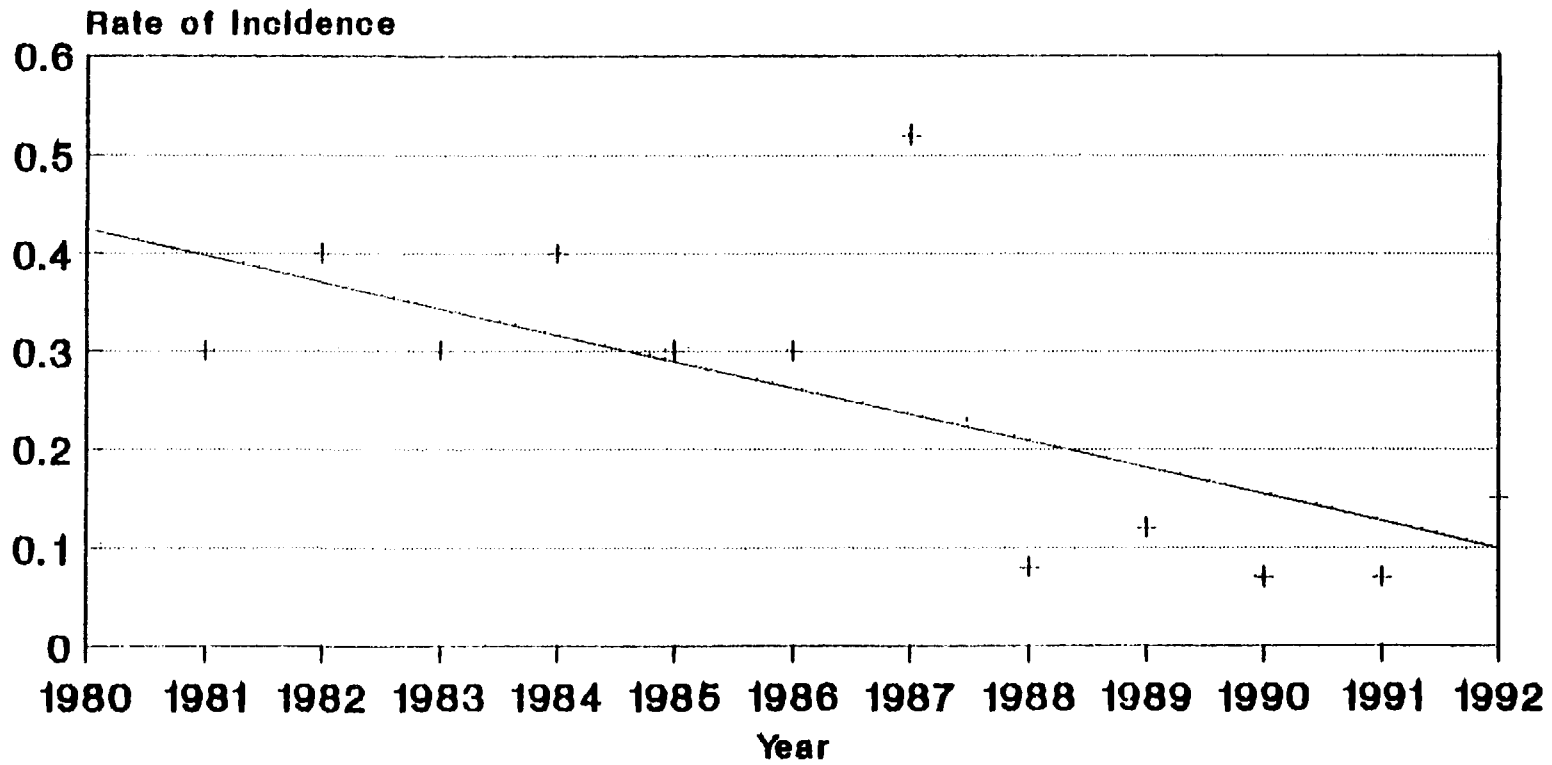
Source: NSCED, 1992

FIG.7: TREND OF IMMUNISABLE DISEASES IN MALAYSIA



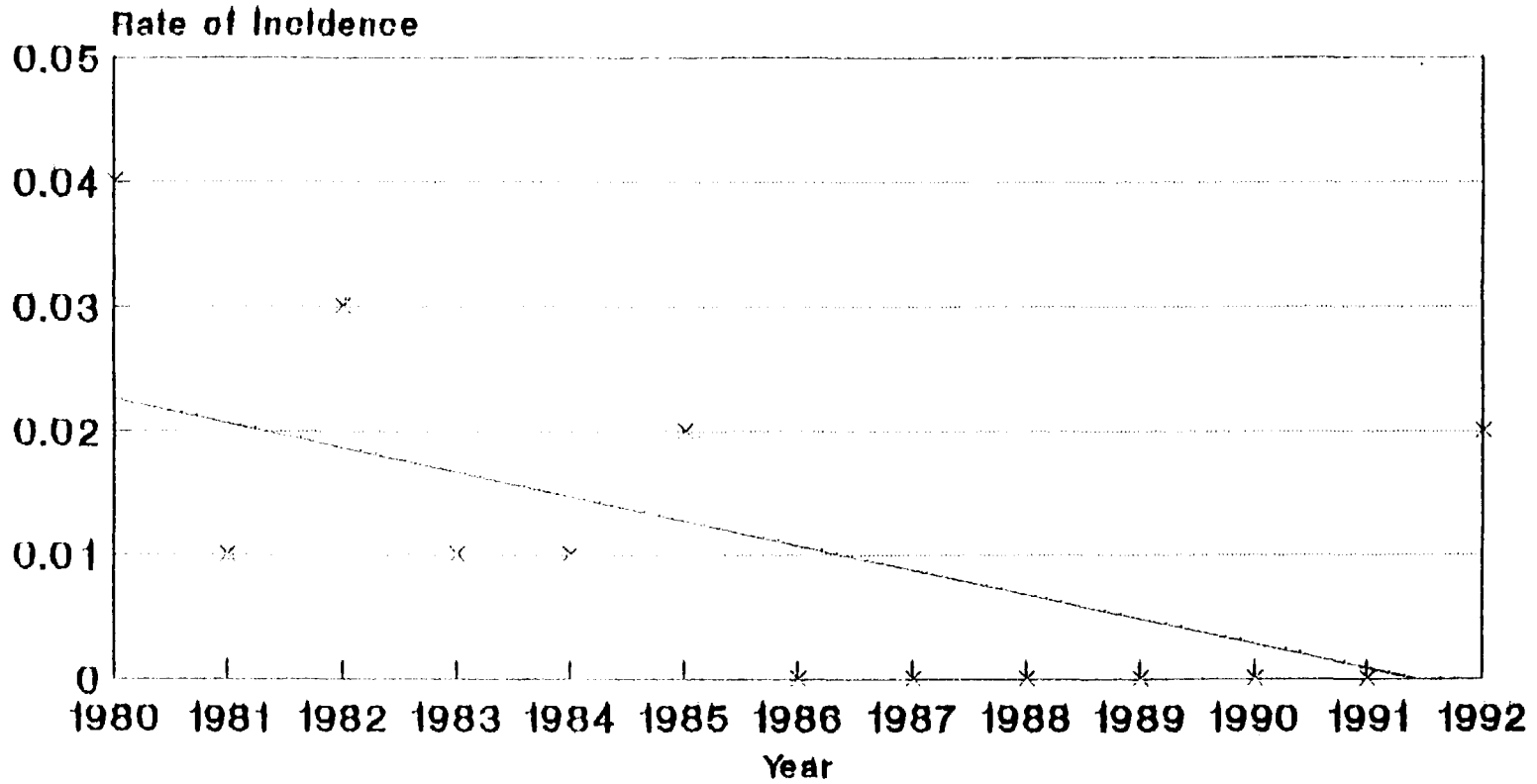
* Measles

FIG.7A: TREND OF IMMUNISABLE DISEASES IN MALAYSIA



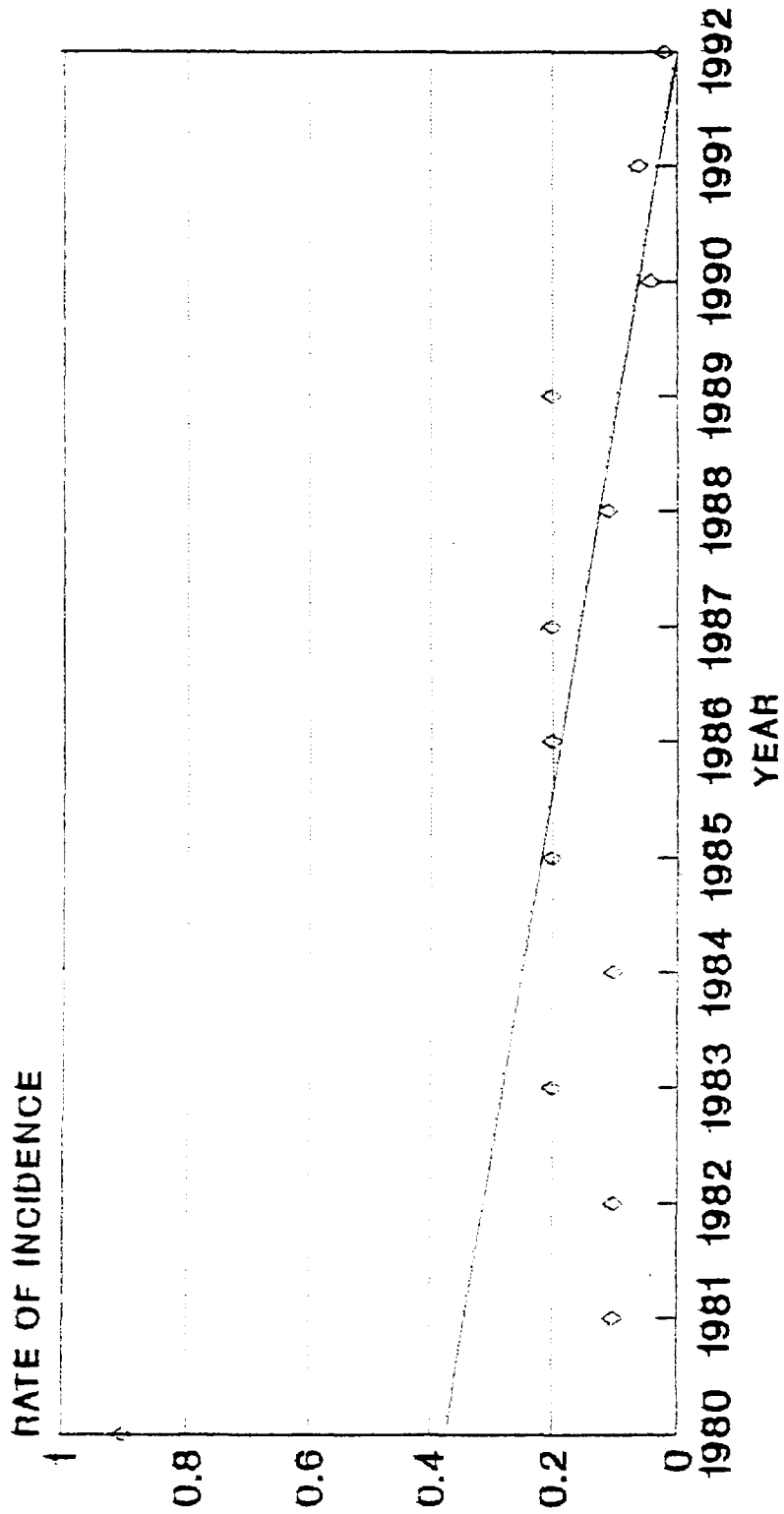
—+— Tetanus (All Types)

FIG.7B: TREND OF IMMUNISABLE DISEASES IN MALAYSIA



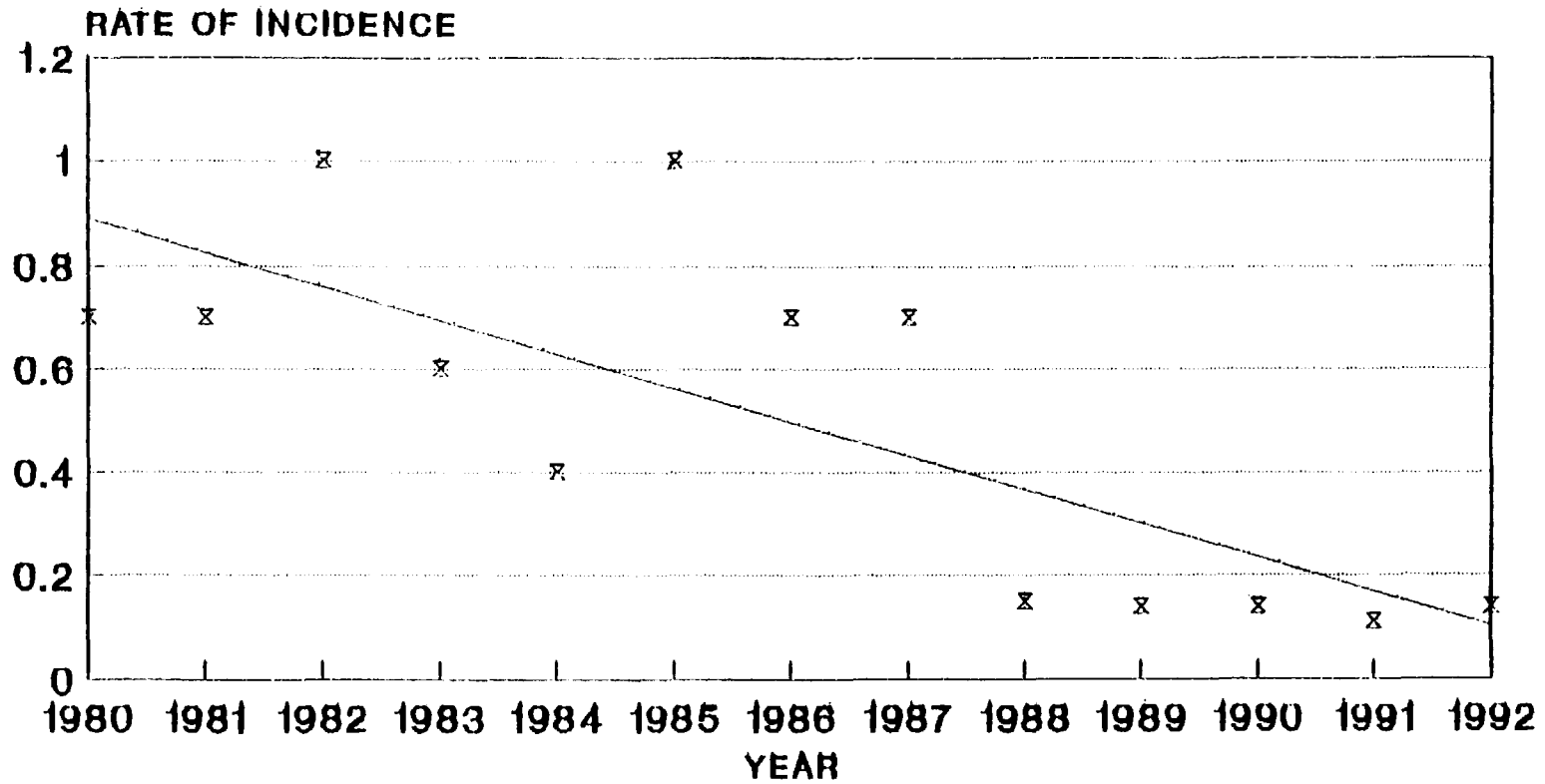
—x— Polio

**FIG.7C: TREND OF IMMUNISABLE DISEASES
IN MALAYSIA**



◆ Diphtheria

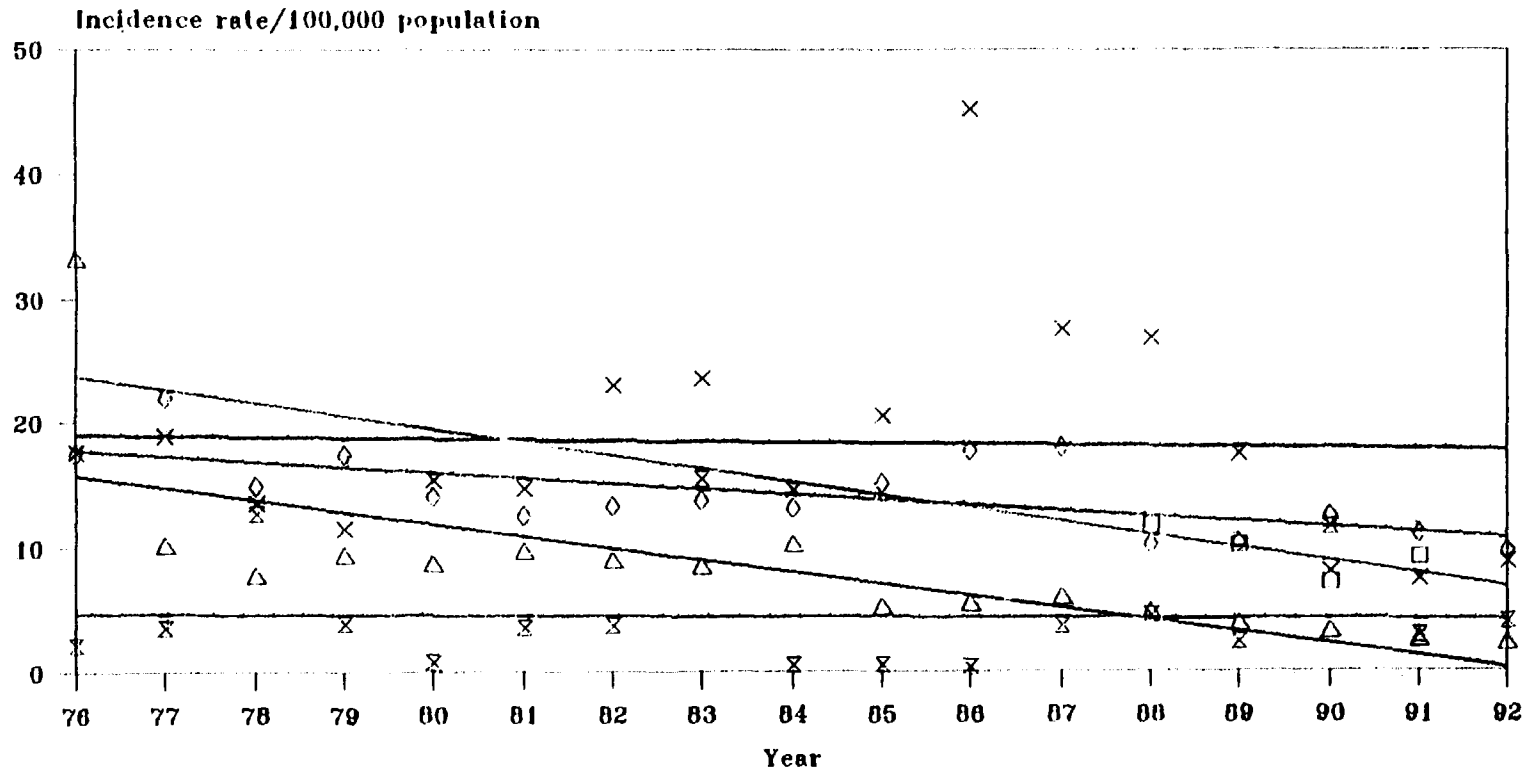
FIG.7D: TREND OF IMMUNISABLE DISEASES IN MALAYSIA



x Whooping Cough

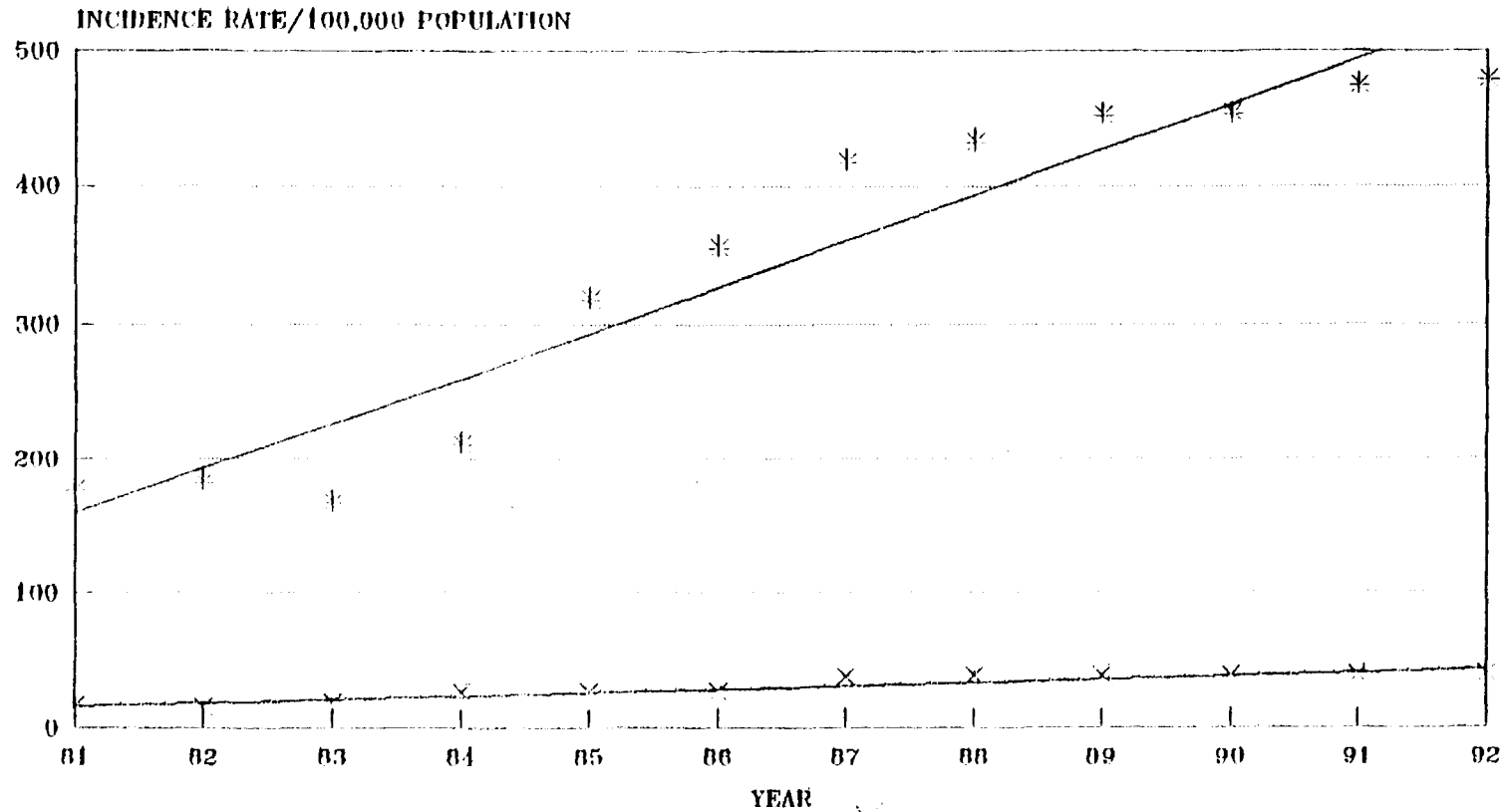
FIGURE 8

TREND OF WATER-BORNE NOTIFIABLE COMMUNICABLE DISEASES



- CHOLERA
- △— DYSENTERY (ALL TYPES)
- ◇— TYPHOID/PARATYPHOID
- ×— VIRAL HEPATITIS
- HEPATITIS A

FIG.9: TREND OF CARDIOVASCULAR DISEASE (CVD) IN PENINSULAR MALAYSIA



-*- INCIDENCE RATE -x- MORTALITY RATE

INCIDENCE RATE & MORTALITY RATE

TABLES

TABLE 1: 1992 BACTERIOLOGICAL ANALYSIS OF RAW WATER FOR MALAYSIA

STATE	TOTAL COLIFORM			FAECAL COLIFORM		
	Above 5,000			Above 5,000		
	A	B	C	A	B	C
Perlis	88	5	5.7	44	4	9.1
Kedah	1354	481	35.5	1303	322	24.7
Pulau Pinang	826	172	20.8	740	114	15.4
Perak	536	5	0.9	603	6	1
Selangor	1473	677	46	1462	415	28.3
Wilayah Persekutuan	-	-	-	-	-	-
Negeri Sembilan	1193	528	44.03	1152	305	26.5
Melaka	182	100	54.09	177	41	23.2
Johor	620	39	6.03	648	35	5.4
Pahang	2486	929	37.04	2452	300	12.2
Terengganu	420	108	25.07	379	100	26.4
Kelantan	291	40	13.07	278	19	6.8
P. MALAYSIA	9469	3084	32.06	9238	1661	18

A = No. of samples analysed
 B = No. of violations
 C = % of violations

Source: Siru, 1993

TABLE 2: BACTERIOLOGICAL COMPLIANCE OF DRINKING WATER SUPPLIES

STATE	FAECAL COLIFORM		
	Samples taken	No. of samples complying to standards	Percentage of Compliance
Perlis	373	366	98.1
Kedah	5815	5695	97.9
Pulau Pinang	2997	2990	99.8
Perak	3878	3813	98.3
Selangor	6922	6773	97.8
Wilayah Persekutuan	1569	1551	98.9
Negeri Sembilan	4629	4487	96.9
Melaka	2109	2089	99.1
Johor	7929	7821	98.6
Pahang	8935	8792	98.4
Terengganu	3600	3583	99.5
Kelantan	2662	2639	99.1
Pen. Malaysia	51418	50599	98.4
Sabah	1607	1461	90.9
Sarawak	9735	9639	99.0
MALAYSIA	62760	61699	98.3

Source: Ministry of Health Database, 1994

TABLE 3: TYPE OF NEOPLASMS (KANSER)
IN MALAYSIA (1987 - 1991)

Jenis Kanser (Neoplasm)	Tahun				
	1987	1988	1989	1990	1991
1. Malignant Neoplasm of Lip/Oral Cavity and Pharynx	2,279 (170)	2,363 (194)	2,684 (198)	2,479 (172)	2,302 (176)
2. Malignant Neoplasm of Digestive Organs and Peritoneum	5,287 (591)	5,787 (650)	6,089 (646)	6,071 (640)	5,878 (611)
3. Neoplasm of Respiratory and Intrathoracic Organ	3,547 (495)	3,600 (488)	4,019 (552)	3,903 (550)	3,694 (522)
4. Malignant Neoplasm of Bone/Connective Tissue/Skin/Breast	3,304 (153)	3,266 (163)	3,754 (197)	3,495 (212)	3,465 (231)
5. Neoplasm of Genito-urinary Organ	4,871 (197)	4,982 (233)	5,702 (202)	5,140 (221)	5,008 (230)
6. Malignant Neoplasm of Unspecified Site	1,703 (127)	1,711 (137)	1,873 (155)	2,014 (150)	1,797 (147)
7. Neoplasm of Lymphatic System	3,481 (270)	3,460 (222)	3,720 (264)	3,743 (279)	3,910 (269)
JUMLAH	24,472 (2,003)	25,169 (2,087)	27,841 (2,214)	26,845 (2,224)	26,054 (2,186)

() denotes death

Source: Epidemiology, 1993

**TABLE 4: TOTAL NUMBER OF MOTOR VEHICLE TRAFFIC ACCIDENTS
ADMITTED AND DEATHS IN GOVERNMENT HOSPITALS
IN PENINSULAR MALAYSIA**

Year	Peninsular Malaysia	
	Admission	Death
1970	8,068	313
1971	8,356	291
1972	9,135	281
1973	10,838	380
1974	12,208	469
1975	14,647	521
1976	15,513	448
1977	18,476	588
1978	17,302	419
1979	17,404	393
1980	17,906	413
1981	19,533	406
1982	20,554	463
1983	22,159	577
1984	21,765	693
1985	58,170	1,502
1986	51,773	1,430
1987	47,601	1,274
1988	47,893	1,207
1989	5,351	1,347
1990	53,366	1,452
1991	53,504	1,505
1992	57,908	1,590

Source: IDS Database, 1994

TABLE 5: NUMBER OF DENGUE CASES AND
INCIDENCE RATES IN MALAYSIA
(1988 - 1992)

Year	No. of Cases	Incidence Rate (per 100,000)
1988	1,428	8.53
1989	2,564	14.96
1990	4,880	27.47
1991	6,628	36.41
1992	5,473	29.38

Source: Vector, 1993

TABLE 6: NUMBER OF MENTAL DISORDERS ADMITTED TO
GOVERNMENT HOSPITALS IN PENINSULAR MALAYSIA

<u>Year</u>	<u>No. of Admissions</u>
1970	13117
1980	18638
1988	26680
1989	26654
1990	27693
1991	28986
1992	28769

Source: IDS Database, 1994

APPENDICES

ENVIRONMENT-RELATED LEGISLATION IN MALAYSIA

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| <ol style="list-style-type: none"> 1. Waters Enactment, Chapter 146, 1920 2. Mining Enactment, Chapter 147, 1929 3. Mining Rules, GN. 2426, 1934 4. Forest Enactment, Chapter 153, 1935 5. Natural Resources Ordinance, 1949 6. Poisons Ordinance, 1952 7. Merchant Shipping Ordinance, 1952 8. Sale of Food and Drugs Ordinance, No. 28 and LN 537, 1952 9. Dangerous Drugs Ordinance, No. 30, 1952 10. Federation Port Rules, 1953 11. Irrigation Areas Ordinance, No. 31, 1953 12. Drainage Works Ordinance, No. 1, 1954 13. Medicine (Sales and Advertisement) Ordinance, No. 10, 1956 14. Explosives Ordinance, 1958 15. The Road Traffic Ordinance, 1958 16. Land Conservation Act, Act 3, 1960 17. National Land Code, Act 56 & P.P. 474, 1965 18. Housing Development Act (Licensing and Control), 1965 19. Radioactive Substances act, Act 17, 1968 20. Civil Aviation Act, Act 3, 1969 21. Malaria Eradication Act, Act 52, 1971 | <ol style="list-style-type: none"> 22. Continental Shelf Act, 1966, Act 83 (Revised), 1972 23. Petroleum Mining Act, Act 95, 1972 24. City of Kuala Lumpur (Planning) Act, Act 107, 1973 25. Environmental Quality Act, Act 127, 1974 26. Geological Survey Act, Act 129, 1974 27. Street, Drainage and Building Act, Act 133, 1974 28. Aboriginal Peoples Act, 1954, Act 134 (Revised), 1974 29. Factories and Machinery Act, 1967, Act 139 (Revised), 1974 30. Pesticides Act, Act 149, 1974 31. Destruction of Disease-Bearing Insects Act, Act 154, 1975 32. Municipal and Town Boards (Amendment) Act, Act A289, 1975 33. The Protection of Wildlife Act, Act 76, 1972 (Revised), 1976 34. Antiquities Act, Act 168, 1976 35. Local Government Act, Act 171, 1976 36. Town and Country Planning Act, Act 172, 1976 37. National Parks Act, Act 226, 1980 38. Malaysian Highway Authority Act, Act 231, 1980 39. Pig Rearing Enactment, 1980 40. Atomic Energy Licensing Act, Act 304, 1984 41. Exclusive Economic Zone Act, Act 311, 1984 42. National Forestry Act, Act 313, 1984 43. Fisheries Act, 1963, Act 317, 1985 |
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**RESPONSIBILITY AND FUNCTIONAL DELINEATION
OF ENVIRONMENTAL HEALTH ACTIVITIES**

Activity	Agency Responsible	Agency Executing
Solid waste management	Local Authority	Local Authority with advice from Ministry of Health and Ministry of Housing and Local Government
Sewerage	Local Authority	Local Authority with private consultants. Standards, guidelines and policies by MoH and MHLG
Water supply/Drinking water quality	Water Authority Water Works Dept. Public Works Dept.	Water Authority Drinking water quality surveillance by MoH
Toxic and hazardous waste	Dept. of Environment	Local Authority Department of Environment
Air pollution	Dept. of Environment	Department of Environment
Occupational health	Ministry of Health Factory and Machinery Department	Ministry of Health Factory and Machinery Department
Industrial Wastewater	Local Authority Dept. of Environment	Local Authority Department of Environment
Food Sanitation	Local Authority Ministry of Health	Local Authority Ministry of Health
Urban drainage	Local Authority	Local Authority Advice from D.I.D.
Building, safety and sanitation	Local Authority	Local Authority (Uniform Building By-Laws)

Source: Pillay, 1993